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NOISE ABATEMENT AND CONTROL

Vol. V—Agricultural and Recreational Use Noise

Denver, Colorado September 30-October 1, 1971

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Vol. V—Agricultural and Recreational Use Noise

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Conducted by
the
Office of Noise Abatement and Control

U.S. Environmental Protection Agency
Washington, D.C. 20469

PREFACE

Under the Noise Pollution and Abatement Act of 1970 (Title IV to the Clean Air Amendment of 1970 (PL 91-604), the Environmental Protection Agency, through the Office of Noise Abatement and Control, is required to hold public hearings. A series of eight of these hearings is being conducted in selected cities to aid the office of Noise Abatement and Control in compiling information relevant to its investigation of the Problem of Noise Pollution. Further, these hearings present an opportunity for the public and industry to express their viewpoints on the general subject of noise control. The volumes in the complete series will be:

Vol. I —Noise in Construction

Vol. II —Manufacturing and Transportation Noise (Highway and Air)

Vol. III —Urban Planning, Architectural Design; and Noise in the Home

Vol. IV —Standards and Measurement Methods, Legislation and Enforcement Problems

Vol. V —Agriculture and Recreational Use Noise

Vol. VI —Transportation (Rail and Other), Urban Noise Problems and Social Behavior

Vol. VII —Physiological and Psychological Effects

Vol. VIII—Technology and Economics of Noise Control; National Programs and their Relations with State and Local

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ENVIRONMENTAL PROTECTION AGENCY

PUBLIC HEARING ON AGRICULTURAL AND RECREATIONAL USE NOISE

THURSDAY, SEPT. 30, 1971

The hearing was convened at 9:40 a.m., Dr. Alvin F. Meyer, Jr., Director, Office of Noise Abatement and Control, Environmental Protection Agency, presiding as Chairman.

PANEL:

Dr. Clyde Berry, University of Iowa

James Botsford, Bethlehem Steel Corporation

Dr. John Fletcher, Memphis State University

Boyd Norton, Friends of The Earth

Richard Strunk, Bolt, Beranek & Newman

PROCEEDINGS

Dr. **MEYER**: I'm Dr. Alvin Meyer, Director of the Environmental Protection Agency, Office of Noise Abatement and Control. I am convening this hearing under the authority of Title IV, Public Law 91-604, the Noise Pollution Control and Abatement Act of 1970. This public hearing will be conducted following the general rules utilized by the House Committee on Government operations of the House of Representatives.

Under those rules witnesses will appear and give their testimony, following which the members of the panel, whom I shall introduce in a minute, and myself will direct questions as appropriate and make comments as appropriate to the witness, and we do not in this type of proceeding engage in a debate from the floor with the witness. If there's anybody present that has a question that they feel is appropriate, you may write it out and hand it to one of our staff members who will give it to me, and I will either ask the question or ask one of the panelists to respond, or if it is a narrower range and an interesting type of question, I will arrange for the person who wrote the question to meet either with the witness or panelists so we may proceed in an orderly fashion.

I will also point out that if anyone feels after hearing the testimony that they have a statement to submit for the record, the record stays open for two weeks. We will be happy to receive it through the Environmental Protection Agency here or in my office in Washington, or time permitting we will schedule a statement by a person who desires to make it today.

I must say that these public hearings to date have provided a magnificent amount of information probably unprecedented in its nature with regard to the problem of noise. I might, in the few minutes while we're waiting to get under way with Mr. Green, who is Mr. Ruckelshaus' Regional Administrator—I feel that I should let him make his welcoming remarks before starting—that you might be interested in knowing what is done with all the information we accumulate.

First and foremost the entire verbal transcript—and as you can see, we have a court reporter who is taking down every word that's said—is compiled in our office and submitted to the United States Government Printing Office and it is printed. We allow, as I said, about two weeks for submissions for the record, and it takes about six weeks to go through the process of printing. In approximately two months a bound printed document emerges entitled transcript of the testimony presented to the Environmental Protection Agency's hearings under the title held at such-and-such a place, and all the papers are reproduced and, to the extent possible, all the submissions for the record. So we wind up with a book of printed pages of somewhere around one and a half to two inches thick.

I think the Government Printing Office charges by the weight. So after we get our first 300 copies, then the public can buy the transcript, and I suspect it will probably cost around $2.50.

It is a matter then of public record and is available for anybody that wants it, and considering the detailed information we've been obtaining, each one of these transcripts appears to me to be—I'm not selling books for the Government Printing Office, but each one of these seems to be very, very useful, and the entire series will probably give a tremendous insight into what the public thinks about noise, what the state of the art of noise control, what major problems there are, and some of the possible solutions.

That transcript is furnished to the appropriate committees of the Congress and, of course, to any Congressmen who are interested and all the other departments and agencies of the Government, so that when criticisms might be directed to a particular department and justification in defense thereof has occurred the agency in question may have a copy of those statements.

That's not the only thing we're doing with it. The panel members—we have different sets of panel members, sometimes overlapping. Some panel members have served with us several times; others only once or twice. Panel members are asked to provide us an overview of their opinions just as if this was a

Congressional Committee: their views as to the significance of what they heard, what they think EPA ought to do, suggestions and recommendations as to specific actions and so on. We take that information and incorporate it in some other documentation that we're preparing for the Congress.

We're taking material obtained from our own observations and incorporating it into a rather massive report to the Congress which is currently in preparation about which I'll speak in a few minutes.

So that's one purpose. Another thing that is being done with this involves analysis by my staff members. I have several types of people on our staff in Washington, including audiologists and biophysicists and engineers and physicians and others interested in noise, but in addition to the people who are normally thought of in the life sciences and physical sciences as being concerned with sound and acoustics and noise, we have on our staff a legal expert who is very proficient in environmental law. I also have a social anthropologist; I have a political scientist; I have several other life scientists; I have an audiologist who is a psychologist. We go through this transcript as it's received and code it and break it apart so that all the specific areas of possible interest and action related to research requirements, related to regulations, related to possible future standard setting, related to future legislative needs, related to technical assistance to the states, related to education, related to the various scientific aspects are identified by coding.

At first we thought we could hand sort this thing, but we've learned that we can't hand sort it, so we're moving to putting this thing on a computer so this information isn't just dry, sterile words on paper that have been accumulated, printed up in a book, submitted to the Congress, and forevermore forgotten.

Also out of this comes some evidence of the need for our working with the other Federal agencies. A lot of that work is being identified.

Well, after having convened the hearing and given you a little insight as to what we do with some of it, at this point we're very honored to have Mr. John A. Green, the Regional Administrator of the Environmental Protection Agency of the Rocky Mountain-Prairie Region, here representing Mr. William D. Ruckelshaus who is our boss. Mr. Green, we're pleased to have you, sir, and glad that you could take a few minutes from your very busy schedule to come over and open this hearing. I hope you'll be able to stay with us for a little while, anyway.

Mr. **GREEN**: Thank you, Al, very much.

Good morning, ladies and gentlemen. I think Al has stolen most of my thunder because I thought I was going to introduce him.

Dr. **MEYER**: I didn't steal any of your thunder other than that.

Mr. **GREEN**: I'm the new Regional Administrator here for the Rocky Mountain-Prairie states. We have five states—Colorado, Montana, North and South Dakota and Utah. We're involved in all pollution areas.

Now, it gives me great pleasure to have you here in Denver. I hope that your stay here will be rewarded.

Under Title IV of the Clean Air Act of 1970, Congress directed the Administrator of EPA to establish an Office of Noise Abatement and Control. EPA is charged with the responsibility of making a complete investigation and study of noise and its effects on public health and welfare. The law also calls for studies on effects of noise on people, wildlife, and property; effects of sporadic and intermittent noises; expected growth of noise problems; and such other data as is appropriate.

A special report to the Congress, which is due not later than the first of January, 1972, is being prepared. This report will include information on present Federal research and operational programs relating to noise control; on State and local laws, regulations, and enforcement capabilities; and on the state-of-the-art of noise control technology. Recommendations about a long-range noise control and abatement program will also be included.

In connection with this report, this week, the EPA Office of Noise Abatement and Control is conducting public hearings on noise pollution in cities all over the United States. Some of these have already taken place. Atlanta, Georgia, I think was one site. There are hundreds of concerned citizens meeting to offer testimony before this Committee. Today we will be addressed by the public witnesses. Tomorrow we will have the technical and trade people in attendance. Later on all the testimony will be included in our report to Congress.

During this hearing, we shall consider specifically the noise produced by agricultural and recreational vehicles; this noise is a typical by-product of two of the major industries in this area.

In very broad terms, we will be talking about:

1) The major sources of agricultural and recreational noise in this region;

2) The causes and effects of this pollution;

3) Analysis of the environmental implications of this pollution, paying particular attention to the effects on humans and wildlife; and,

4) Analysis of the economic ramifications of noise pollution, such as cost to the consumer of abatement measures.

The noise problem was recognized late by this country. Now, as we become more and more aware of its potential threat to people, property and wildlife, new standards, new legislation and new attitudes will be necessary to achieve a desirable decibel level in our environment.

You notice I said, "new attitudes." Just yesterday, I read a letter to the editor in one of our local newspapers. It concerned a group of citizens who criticized the efforts of an anti-noise coalition. The coalition had published a bulletin calling for new noise ordinances on heavy trucks, motorcycles and farm machinery. The opposition group called the bulletin, ". . . the most ridiculous piece of junk we've ever received. . . ."

They went on to say, "Why don't they (referring to the coalition) leave the law alone to take care of the real lawbreakers . . . the ones who steal, rob, and kill . . . instead of bothering them about such trivial things?"

Excessive noise *is* criminal. It creates psychological stress in man, inhibits concentration and affects alertness and response. It can also rob a man of his hearing. We are only just beginning to understand some of its disastrous effects on wildlife.

As you can see, bringing about new public attitudes *is* a primary responsibility of this noise hearing. Ultimately, however, we must go further and create an environment in which noise does not interfere with man's psychological or phsiological health and does not adversely affect man's other values—values which are just as necessary to his well-being as a sound body and mind.

Thank you very much, Al. I'll turn this over to you.

Dr. Meyer: John, I appreciate your condensing for us the scope and purpose of the hearing. I also want to congratulate you on your recent confirmation in this very important job.

I would like to make a comment. While noise is one of the newer problems that we're concerned with, it's a long-standing one, but those of us in the Agency concerned with the problem are keeping in view, just as you have to keep in view, the fact that we're talking about a multiplicity of environmental problems which you can't really separate. The Environmental Protection Agency is truly concerned with all aspects of the environment and the relationship of all of the various insults and stresses that exist on the environment. We look upon this as an attribute of a total program.

I think in a recreational area this is especially true. While noise is a major insult, some sources of noise are also problems because of other insults to the environment.

I hope you'll stay with us for a little while, anyway. I know how busy you are.

Mr. Green: Unfortunately, I have to catch a plane in an hour, but I'll stay as long as I can.

Dr. Meyer: At this point then I'd like to ask if Dr. Stephen Williams of the PLAN-Boulder Commission of Boulder, Colorado is here.

Dr. Williams: Yes.

Dr. Meyer: Fine. Would you come up, and I'm sure Mr. Green will yield his seat and come over here and sit with us. Right here, John, if you'd just take this chair at the end. I'd appreciate your staying with us as long as you can.

Dr. Williams, welcome to our hearing, and we're looking forward to hearing from a representative of your organization, sir.

STATEMENT OF DR. STEPHEN F. WILLIAMS, PLAN-BOULDER COUNTY

Dr. Williams: First I should say the only thing that I'm a doctor of is a doctor of law, and that is because retroactively the law scale has all shifted, LL.D's and J.D.'s.

Dr. Meyer: I think considering the educational process that a lawyer goes through and the length of time involved that that was a wise move in the legal profession.

Dr. Williams: They ought to call us doctors.

Dr. Meyer: Go ahead, sir.

Dr. Williams: I'm not sure.

The organization to which I'm speaking is PLAN-Boulder County which is a civic organization essentially devoted to trying to work on improving planning of every kind within the County of Boulder. The fact that I am speaking for a Boulder County organization has some significance.

The City of Boulder happens to have one of the most progressive noise ordinances in the country, possibly the most progressive; I'm not in a position to say, and the first topic I want to talk about is the significance, the importance, of assuring that any Federal legislation in the noise field reserves to states and municipalities the power to impose standards which are higher—and by higher I mean more stringent—than Federal standards.

The other topic that I'd like to talk about is the overall impact that adequate noise control legislation can have on urban planning generally.

On the issue of whether or not the—let me focus a little more. As you probably know, Section 6(d) of H.R. 5275 as presently drafted would prohibit states and municipalities from imposing any stricter standards in areas where the Environmental Protection Agency had exercised its authority to promulgate regulations under that bill. We emphatically oppose Section 6(d), and, in fact, we would call very strongly for exactly the opposite provision being put into the bill; namely, an explicit statement to the effect that nothing in the Act shall in any way limit the power of states and municipalities to protect the health, safety and welfare of its citizens by suitable noise control legislation.

Now, I think there are two things that are important to bear in mind about the right of states and municipalities to impose their own stricter standards. First, what are the practical limitations on that? Second, what are the advantages that may accrue from allowing them that power?

As to the limitations, the limitations are very great. As a practical matter, a municipality or state cannot impose olympian standards on noise. First speaking of terms of the noise of manufacturing plants, sadly enough, municipalities and states all over the country are competing vigorously for the payrolls and the taxable values that are represented by industry. It's perfectly clear that no state or municipality is going to utterly crowd out manufacturing activities. The practical limitation on the upside there is very great.

Second, in terms of controlling the noise of implements, lawn mowers, chain saws and so forth, the fact of the matter is that most people like to have these implements around, and, therefore, it is clear that no state or municipality is going to impose standards that are higher, more stringent, than those of the manufacturer making the quietest tool. So that there is no danger that manufacturers of, say, lawn mowers will be precluded from the market. The most that could happen is that they would be precluded conditionally, the condition being that they meet the standard of the best manufacturer in the field, because that is going to be—it is necessarily going to be the standard adopted by the state or municipality.

What are the advantages of allowing states and cities to impose their own controls? One is an important constitutional principle, and that is the view on which our Federal system was founded, that there are tremendous values to be derived from allowing local experimentation. If you look to what those values may be in the area of noise control, I think there are these: One is simply recognizing the fact that the impact of noise is a matter of important local concern, and it's hard to see any reason why each municipality should not be allowed to make the trade-off to decide for itself as to what the trade-off should be between, on the one hand, amenity, health, quietness, comfort; and, on the other hand, the inevitable costs that this involves in terms of raising the price of the tools that are bought, the vehicles, whatever, and also of the manufacturing facilities which make noise.

The second thing is in terms of attaining progress in this field, the value of experiment is considerable. If a manufacturer has ahead of him the incentive of meeting a special market, he will have the incentive to persevere in research for better methods of noise control, cheaper methods of noise control, and so the existence of municipalities with more stringent standards will be a substantial spur to the manufacturers. Ultimately, the effect of that can be at least to lead to the adoption of higher standards by a substantial number of municipalities and ultimately to a general improvement of the standards, taking advantage of the technology which will be developed by the more experimental manufacturers.

On this question of local option, people might leap to the conclusion from what I'm saying that I am opposing the imposition of Federal standards. Nothing could be farther from the truth. It is absolutely vital, I think, to have Federal minimum standards, and the reason for that is the great difficulties that confront a municipality in trying to impose high standards in this field. The result of it, particularly in the area of manufacturing, is to drive away those things which almost every municipality needs; namely, manufacturing, provide employment and income and taxable value for those cities, and the result of having no Federal standards is that very few municipalities will have the courage and the sense of values to actually impose any standards at all. The impact of that on health of the citizens of this country, I think, has been already deleterious and will continue to be if there aren't Federal standards.

If you would like to ask questions on that issue or argue or whatever—

Dr. **MEYER**:—Well, this isn't a debate, so we're not going to get into an argument. Normally I would suggest you go on through with your statement, but since you've raised the issue, let me respond rather than having the panel respond to this. This is a position that the Government itself must respond to; or at least the administration must.

It's quite clear that we've carefully examined all of these questions in the preparation of the administration's legislative proposal, and it ought to be noted that the majority of bills submitted on both sides of the House, both sides of the aisle, include this pre-emption provision. Let me respond to this part of this a little bit like this.

It seems to me that there's several things that are inherent here. One is the fear of the Federal Government being too lenient, that it won't adopt the most rigorous standards possible. I think I could set your mind at rest that those of us concerned with the noise problem recognize that the ears of people in Boulder are very little different from people in the canyons of New York City. It's just a different kind of canyon.

So, therefore, we've got to take into account the fact we're talking about an acoustical energy release on the human mechanism. Whether it's from a snowmobile or a 12-axle truck, we've still got to protect our hearing.

The other one is that there's a problem of interstate commerce. The Constitution of the United States does, indeed, reserve the states those powers not explicitly mentioned in the Constitution, but it does say no state or political subdivision may undertake any rule, regulation or action which will impede interstate commerce, and this has been tested in the courts rather extensively.

If I might, let me give you a real problem of concern, as distinguished from community ambient or residual noise standards, that we are faced with. If I might use a very practical example, I shall.

There are two competing stockyards. One is Denver and one is Omaha. In the last 20 years, perhaps 25 years, there's been a demise of movement of cattle in the stockyards on railroad cars. It's almost entirely exclusively by truck. As a matter of fact, I'm sure you have observed this Denver stockyards. They occasionally have trucks backed up for some 12-15 blocks. In Omaha on L Street they sometimes extend some 40 or 50 blocks.

Now, let's see the problem that would be faced by the owner of a ranch or the owner of the trucking firm in Denver and Omaha, and let's say also if some of those trucks had to come through Boulder, of different standards for the truck itself. I'm talking about the vehicle itself. The farm owner or the truck owner is going to be faced with a market limitation and interference with how he could move his cattle if there are two different standards. You could even get into sort of a noise war in which one state might have very lenient rules and the other one very strict rules, and within the state itself there might be different rules. What would happen here is the creation of a market impact, and I'm giving you a real problem example in agriculture of a problem of a multiplicity of standards, forgetting about the manufacturer's problem. I'm talking now about the user's problem.

That's why the administration proposed that there be single standards for the source but that the community could establish all sorts of land use restrictions and ambient restrictions which might even make it necessary for a detour around the city and the use of peripheral roads. If you wanted to do that, you could do that.

I don't want to get into extensive debate on this, but I just wanted to give you a thought that as a lawyer trying a case, you might have a real problem with it on either side. I'll ask at this point if anybody on the panel has an observation that they'd like to make. I hope I've put this into proper prospective.

Dr. Fletcher: I think one of the problems you'll face is the problem of having access to competent persons in the noise measurement analysis and expertise in the effects of this noise at municipal and local levels, too, your problem being one of what is the necessity of laws which you can't adequately enforce or properly supervise, and people with these particular capabilities might not that likely be available at all municipal levels; and this is a serious problem first in the formulation and expression of the law in proper form where it could be adequately policed, and secondly then in the policing—I'm sure you probably had to think about this—but it could be a very serious problem from municipality to municipality.

Dr. Williams: I regret to say that even in Boulder where we have a very fine noise control ordinance things occur which I cannot believe are in conformity to the law.

Dr. Meyer: Well, at our hearing in San Francisco the last three days that problem of enforcement was touched on, and I must admit we've got to do a lot more about helping states and cities come up with improvement.

I think we should go on, sir. I appreciate your comments, and I'm glad you're bringing them up because it certainly outlines a very important consideration which I know will run throughout this hearing.

Dr. Williams: Okay, fine. The other point that I want to make is, in a sense, in the nature of a pep talk in that it does not explicitly—I have no specific decibel levels to propose, no particular carving out of exceptions to propose, nothing of that sort. I do want to call your attention to what seems to me an invariably overlooked ramification of noise control, and that is the overall impact that it has on the structure of our cities and the nature of city planning. This goes quite beyond the direct problem of preserving health and reasonable levels of amenity in terms of noise.

At the present time our cities confront the problem of essentially the collateral effects of industrial revolution in terms of noise, air pollution, which I'm sure you work on, your Agency works on, a great deal; odor control, lighting, flashing signs, esthetic violations of amenity, and the characteristic solution to these problems has been two-fold. One, segregation of use having areas where you may have only residential activity and other areas where you have commercial business, entertainment, manufacturing. The second basic method that has been used is essentially using space as a buffer, and the characteristic form there is large-lot zoning, whether it be even in terms of a tenth of an acre, which, of course, is a great deal more land than historically people were accustomed to occupy.

The results of these solutions have possibly been worse than the disease. The first result, particularly from segregation of use, has been that you have center cities which are totally deserted at night, dull, isolated, lifeless, no people on the streets, and those of you who live in Denver, if you venture out into the streets of downtown Denver at night, I'm sure you're familiar with this. They're almost entirely deserted.

I can well remember a Saturday night when I was in Denver and the only other people on the streets appeared to be a few winos, and that's really characteristic of the American downtown. Essentially the people who used to live in downtowns have moved away, and they've been encouraged by zoning in order to protect them from these adverse effects of our technology.

In terms of using space as a buffer, the cost of that has also been tremendous, particularly because it has made one means of transportation the only usable means of transportation; namely, the automobiles. The automobile is the only means which can function with any degree of efficiency when you have the sparce settlement which characterizes our cities.

I think these problems are soluble and are soluble essentially in terms of imposing performance limitations on precisely these things from which people are fleeing. It does very little good to flee the center city, to go out into a suburban street where there are powerful, dangerous, noisy, air polluting motor vehicles dashing through. So that if performance controls of a sufficiently high level are imposed and enforced, I think again once more the center city can be made an agreeable place to live and that people will move there and you will have a restoration of the type of integrated city life where there is movement on the streets, life throughout the day and through the reasonable hours of the night, where the streets are not abandoned to the criminal classes and a few victims, and what you are doing in terms of noise control is a very important aspect of that. What your Agency is doing in terms of air pollution control is terribly important. Most of the other things probably have to be solved principally by the municipalities themselves, but I think that when you formulate your standards, you have to think not only in terms of simple health, but safety and welfare, and I think safety and welfare involve trying to make the center city again a place where people voluntarily will live.

That's all I have.

Dr. MEYER: Well, before asking the panel if they have any comments or questions, Dr. Williams, I would say that you've brought a point out that I think is very important which some people tend to forget about. When they talk about environment, there is something called an urban environment as well as a rural environment, and it's clearly important to man, because of the vast concentration of our population into this urban environment. I certainly appreciate your highlighting it because while we're talking today about recreational and agricultural noise, people who go and recreate generally are from urban places.

Dr. WILLIAMS: They spend at least five days out of the week in the city.

Dr. MEYER: I'm glad you brought this up because it is a most important issue.

Panel on my left, any comment or question?

(No response.)

Dr. MEYER: Right?

(No response.)

Dr. MEYER: Fine. Thank you very much, sir. Your remarks are most helpful.

Dr. **Williams**: Thank you.

(The following is the written statement submitted by Dr. Stephen F. Williams: "I am speaking simply as a representative of a group of citizens—citizens who happen to live in a city with one of the most progressive noise-control ordinances in the country. I want to make two points: (1) the overwhelming importance of preserving the right of states and towns to impose standards that are stricter than the federal ones; and (2) the impact that stringent and well-enforced noise-control legislation can have, not merely upon the health and amenities of urban life—the freedom from undue noise—but upon the possibilities for more humane planning of cities.

"First, on the issue of preserving the local option of imposing stricter standards. The casual observer might say, 'Well, if you are going to allow localities to impose stricter standards, why not let them impose looser standards; in other words, why not forget about federal regulation altogether.'

"The difference is critical. In the absence of federal minimum standards, it is very hard for a city to impose any standards at all. Particularly as regards manufacturing facilities, the citizens and politicians are likely to be told by the managers of a business: 'If you impose these standards, we'll simply move out'; or, if they have not yet settled, 'We won't come here.' Most towns find it very hard to lose a payroll or a tax ratable. The result is that it is exceedingly difficult to secure the enactment of adequate standards. And, once adopted, the standards are subject to steady erosion: we see this every day as competition for industry causes the lowering of zoning standards. For this reason federal minimum standards are essential.

"There is no reason, however, why the federal minimum should also be a maximum. No such competitive escalation will follow from allowing local governments to increase their standards. These are always limited, as a practical matter, by two factors: In the case of industrial plants, the fear of scaring away payrolls and tax ratables will force localities to be reasonable. In the case of noisy products, the desire to be able to use chain saws, lawn mowers, etc., will force municipalities to set their standards no more stringent than those of the manufacturer who makes the quietest tool.

"If what municipalities can do with their freedom to experiment in the direction of more exacting standards is limited, what value does it serve? Enormous values, is the answer. Federal standards, the result of a nationwide process of accommodating manufacturers and citizens, will quite certainly not be at the highest feasible level. (By 'highest', I mean most stringent.) Indeed, if one is willing to pay the price, the highest feasible level is silence, and it is clear that the federal standards will not be that high. But our federal system is based on, among other things, a sense of the value of local experimentation. And one of the permissible local experiments should be with greater local amenity. If, for instance, there are manufacturers that make products quieter than the federal standards, why should a locality not be able to limit itself to those quieter products?

"More important, local imposition of stricter standards will develop a market for the quieter machine; it will tend to demonstrate its feasibility; and it will enable localities to decide for themselves just how they want to adjust the trade-off between greater health and amenity, on the one hand, and thrift, on the other.

"No manufacturer is unjustly harmed by this flexibility: relatively few localities will have the gumption, value system, and sense of priorities to raise their standards above the federal one, and, by definition, they will raise their standards to levels met by manufacturers: no town is going to do without lawnmowers altogether. But as the market for quiet machines increases in size, more manufacturers will shift to production of those items. It will create pressure for progress toward the highest feasible noise standards. And only the local option can create such pressure.

"I might add further that the *only* way for standards to rise is by legislative action. The ordinary individual is so little affected by the noise of his own machines that only a few public-spirited people will voluntarily buy the more expensive, quieter ones. In the more usual case, the neighbors are driven to distraction, but have no remedy except in the state or local legislature.

"Coming down to specific legislation, we emphatically oppose Section 6(d) of H.R. 5275, which would deny the states the power to enact performance standards for noises as to any classification of noise as to which the Environmental Protection Administrator exercised his regulatory authority under the bill. The bill ultimately adopted should, in fact, explicitly state the opposite: that nothing therein should be read so as to diminish in any way the power of states to protect the health, safety and welfare of their citizens from noise.

"Finally, we note that in his testimony before the Subcommittee on Public Health and Environment (of the House Committee on Interstate and Foreign Commerce) Congressman Don Brotzman of Colorado noted the adverse impact of Section 6(d). See Hearings of the above Subcommittee, June 23, 1971, p. 318. We fully concur in his remarks.

"Turning now to the second point: the potential impact that noise abatement may have on city planning. At present city planning is bedevilled by the following dilemma: Most commercial, industrial or even high-density residential uses have abrasive collateral effects: noise, air pollution, odors, visual pollution (in the forms of unpleasant signs and lighting), and traffic. The conventional solution to these problems has been (1) to segregate uses, in order to 'protect' the single-family home; and (2) to require large lots for dwellings: in other words, to use space, land, as a protective device; to use it, in the case of noise, as a muffler. The results of this have been two-fold: (1) The integrated neighborhood, in the sense of the neighborhood where the streets are full of people going about their daily business, has almost been eliminated. Shopping and business are done in downtowns that are dull and deserted by night; residential areas are sparsely populated and lacking in animation.

The street as a place for the casual interaction of people has been eliminated. (2) Since all activities are dispersed, and since distances between people have been so enlarged, only one means of transportation is available: the automobile. Its use, to the preclusion of all other forms of transportation, means that people are in fact subject to all the abrasive factors that the system was designed to protect them from: noise, visual pollution, air pollution, and, on top of it, the peril of automobile-dominated streets. Thus, in the flight from these collateral effects of the industrial revolution, cities have condemned themselves to sterility, segregation of function, lifeless streets, and, in general, a condition where people's unplanned encounters with each other are in the nerve-wracking form of auto-drive to auto-drive, not human being to human being.

"While suitable performance controls of noise cannot wholly solve this problem, they are a necessary ingredient in its solution. Unless these abrasive collateral effects, including noise, are brought under direct control, the city cannot be restored as a scene of vibrant, exciting and humanizing personal contacts. It will be condemned to pursue the will-o'-the-wisp solutions of segregation of use and large-lot zoning, with the resulting dehumanization of life.

"As a consequence, the implications of your task go far beyond the obvious importance of freedom from unreasonable noise. Returning to my first point for a minute: The right of localities to impose higher-than-federal standards is vital: only with that power can they assure that such controls will continually be pushed to the strictest feasible levels, and only thus will they be able to assure the reintegration of life in our cities.")

Dr. **Meyer**: I should now like to ask Professor Owen Olpin of the University of Utah of Salt Lake City to come up.

While you're on your way up, sir, I must correct a mistake which I made because of the changes in getting under way. Let me very quickly both for the record and for those who are here introduce the panel. I made a gross assumption that you just knew who they were, but I think it's proper to introduce Dr. Clyde Berry, a long-time colleague of mine in the field of industrial hygiene and occupational health, of the University of Iowa. Mr. James Botsford who is a distinguished worker in the field of audiology and effects of noise on man, and is a distinguished scientist in this area employed by the Bethlehem Steel Corporation of Bethlehem, Pennsylvania.

Dr. John Fletcher, Memphis State University, who is a physician who has worked for a long time in the field of noise control. Prior to being with Memphis State University, he occupied positions of extreme importance in the Army Surgeon General and Army Medical Service dealing specifically with the problems of noise. Boyd Norton probably needs no introduction to people in Denver. He is a distinguished representative of the organization Friends of the Earth and is a physicist. I'm glad to have him with us.

Some of you received a notice that said Dr. Plager of the University of Illinois was going to be on the panel. Dr. Plager was with me in San Francisco, but because of academic duties had to return and will not be able to be with us.

And Mr. Richard Strunk of the firm of Bolt Beranek and Newman. Mr. Strunk is a distinguished worker in the field of noise control. The firm he represents is internationally known for its capabilities in this area.

I'd like to now go ahead. Professor Olpin, excuse us for intruding into your time. Glad to have you here.

STATEMENT OF PROFESSOR OWEN OLPIN, UNIVERSITY OF UTAH

Professor **OLPIN**: Thank you, it's nice to be here. I have submitted a written statement for the record.

Dr. **MEYER**: Fine. If you'd like to just summarize, your statement will be printed in the record along with your remarks, sir.

Professor **OLPIN**: I prefer to summarize. I find it hard to listen to other people read, and I don't want to impose on you in that way.

Dr. **MEYER**: Very good, sir. Thank you, sir.

Professor **OLPIN**: I was unaware that there was going to be a specific emphasis on these hearings in agricultural noises and in recreational vehicles, but fortunately I chose to speak primarily on recreational vehicles and transportation generally, so I hope my comments will be appropriate.

Dr. **MEYER**: In this phase of the hearing such general remarks are perfectly appropriate, so don't feel that you have to confine it to an area or field.

Professor **OLPIN**: Thank you. I think the SST decision that Congress made, hard though it was, is a decision that can be encouraging to us on a number of scores. Not too many years ago I think it's fairly clear that we Americans would have always been willing to pay any price to be first, fastest or biggest. I think the SST decision is encouraging in that it showed the willingness to rethink these priorities and to consider other values. I think the SST is particularly a victory against the battle for peace and quiet. That was probably a very big victory, but it seems to me what we need now are a great many smaller and less dramatic victories in the battle against unwanted and perhaps harmful sound.

I would like to focus my few remarks on the sounds of transportation. It seems to me much, if not most, of the offensive noises we hear do come from transportation. First engines of trucks, cars, busses and so forth. It seems to me that the devices we have known for a long time, whimsically known as mufflers, really haven't developed. We haven't had the market incentives or the laws to push forth innovations in technology that we need to control particularly the large engines on the larger vehicles, and I think it is to a great extent an operation of the market and inattention to the problem.

We're now waking up to this. It seems to me that we're now starting to exert the pressures both on the market and by regulation, and it seems to me that this is long overdue. The inattention to the problem, I think, is in part manifest by the kinds of responses we have seen from the automobile industry to the problem. The typical response is to be greatly concerned about the consumer, the person who buys the automobile, and the answer seems to be to enclose him securely inside his sealed cubicle and to air condition that space and to give him a radio to drown out any outside noise.

The problem that, it seems to me, we face, though, is that we don't think about the people that live near the roadways, the people who are not enclosed in these spaces. The automobile industry is protecting the consumer primarily against the noises that his vehicle and the other vehicles on the road create.

I've talked a little bit about engine noises. It seems to me as you sit beside the roads or as you get in a park surrounded by roads, your hear the wheel noises probably more than you hear the engine noises. I have heard and read protestations that this is a problem that we really simply cannot solve, that the wheels must pass over the road, and that this will inevitably create noise. I think that's an answer that's totally unacceptable. I think that we have proven before that when the market pressure is there, when the regulatory pressure is there, in a meaningful sense, these problems get solved.

I think a prime example of that is cyclamates. We were told that cyclamates could not be gotten out except over a long period of time, but the Government got tough and two months later a number of industries were boasting proudly of having solved the problem. So it seems to me the innovation comes after the pressure is applied.

Dealing with these kinds of problems is not as difficult, it seems to me, as sometimes we make it out to be. I would strongly urge that we use the licensing processes and the vehicle inspection processes as tools to help solve this problem. In addition to developing new technology, we've got to make sure that the technology we've got is used. It seems to me quite easy to establish procedures whereby a car or another vehicle is simply not licensed unless it contains the minimum equipment that we think is technologically and economically feasible. The periodic inspection process, it seems to me, is another checkpoint, and I see no reason why that cannot be used again to enforce use of at least that which we have available to us now.

Let me turn just for a moment to the very specific problem of recreational vehicles. Here it seems to me that we have a phenomenon that we all recognize, perhaps a conscious effort to create noise. We've created a psychology where noise and power are equated. We seem to have a considerable appetite to produce both when we use recreational vehicles. I think the time has passed when we can continue to tolerate that kind of an abuse of the non-user. If it's absolutely essential that the person enjoying the recreational vehicle hear this noise and feel this power, perhaps a transistorized earplug could be attached to the vehicle.

Dr. **Meyer**: Well, that's the first time I've heard that recommendation.

Professor Olpin: Well, it leaves the noise there for those who want it, but for those who are not particularly interested, it takes the noise away.

Again, it seems to me that we have been unusually helpless on this one. There was an editorial in a Salt Lake newspaper this last summer editorializing very strongly against the nocturnal motorcyclists who seem to like the hours between eleven and one in the streets of Salt Lake City. The thing that was distressing was that the newspaper concluded that really there is nothing that can be done about it; it's unfortunate, but there is no answer, and we were all urged to persevere until winter ice and snow drove them from the streets. Again, it seems to me that's patent nonsense. We have simply shown an unwillingness to enact and enforce laws tough enough and to administer those laws by tools we have available; again, the licensing and the inspection process. It seems to me that licenses ought not to be granted; inspection ought not to be approved, on any vehicle that fails to use the maximum available technology. Again, I have trouble because it does seem so simple.

Now, just a couple more concluding points. Then I'd be happy to respond to any questions or comments.

This is the effort that is now under way, which this hearing is a part of, to try to attack this problem for the first time in a really meaningful way and to try to find answers. I think everyone here would be familiar with Title IV of the Clean Air Act and the money that has been made available there to study causes and to study injury. I don't read anything in that law that makes a significant contribution toward cures, and apparently Congress in the future is going to have to authorize and appropriate more money to provide the answers.

One thing, though, that it seems to me we always overlook on this, or if we don't overlook it, we're beaten down quickly, and that is a very viable source of funds and resources to solve this kind of a problem in the transportation industry, and I am speaking of the Highway Trust Fund. It seems to me that the highway transportation industries and consumers are greatly subsidized by the Highway Trust Fund as it is now constituted. You simply do not pay the costs of transportation, as is often alleged, when you simply pay the land acquisition cost and the cost of spreading the roads along the land. There are many other costs that society generally has been obliged to pay. In my view that's a clear and simple subsidy of transportation.

It seems to me that since noise, air pollution and similar environmental problems are created by the transportation enterprise that as long as we have this Highway Trust Fund, it ought to be a legitimate and proper source for paying to find the answers to those problems.

Those are the only comments I have particularly to bring, but I'd be happy to think on any issue that you wish me to from here on.

Dr. Meyer: Well, first before I ask the panel if they have any questions or comments, let me say that I certainly want to commend the approach—and I'm not being facetious—of recognizing the citizens' right, even if it's a minority, to do certain things as long as they don't hurt somebody else. That was a good philosophical thing that you interjected. We all laughed, but the fact still remains that we do have a Federal republic in which the citizens are the masters of their Government, hopefully. I think that it was sort of facetious, but it indicated an awareness that this problem is dreadfully complex.

I'll ask the panel on my right, any questions or comments? Yes, sir?

Mr. **NORTON**: Professor Olpin, can you hear me?

Professor **OLPIN**: Yes.

Mr. **NORTON**: I just want to make a comment. I think your suggestion of using the Highway Trust Fund as a source for helping to alleviate these problems of noise is creative. I think it's a very good one.

I wonder if you have any suggestions concerning another phenomenon, which I'm sure we're all aware of, that I would call the Madison Avenue Syndrome, and that is how do we counter the kind of advertising that really makes people desire noisy vehicles? Do you have any suggestions? How do we get equal time, in other words?

Professor **OLPIN**: Well, as you know, there has been a recent decision by the D.C. Circuit on the Fairness Doctrine dealing with the air pollution and the fuels problem. The same approach could be made there to get across the message in the noise pollution area. I wish I had some better answers than I do. I really don't have a good answer. I'm sorry. The Fairness Doctrine is a possibility, but that's the only thing that occurs to me at the moment.

Dr. **MEYER**: Any other questions on the right?

Mr. **STRUNK**: You indicated that vehicles should not be licensed unless they meet a specific noise limit. How would you propose that these limits be established, at the Federal level or the State level or municipality?

Professor **OLPIN**: I think I'm talking about different things than the prior witness when I talk about transportation. Here I think the Clean Air Act adopted a proper approach by having basically a nationwide standard, a Federal standard. Here we're talking about the kind of interstate commerce, the kind of interstate communication, which I think can be attacked meaningfully only on the Federal level.

So I would propose Federal exclusion in this area, though I find some sympathy with the prior witness in wanting some local options. Maybe they are available in land use planning and in that sort of an approach to the thing, but here I think the Federal answer is the right answer, conceivably using something like the Clean Air Act does to give some room for more stringent local standards in highly extraordinary cases, and I'm referring, of course, to the special dispensation given California under the Clean Air Act in the air pollution problems.

Dr. **MEYER**: Questions on the left?

Dr. **BERRY**: I would wonder, since you have—

Dr. **MEYER**:—Clyde, would you put the microphone closer to you, please?

Dr. BERRY: I wondered, since you considered the use of a transistorized earplug so that the operator of a snowmobile can get the full effects of the power of the instrument, how you would feel about the setting of noise traps on the highway as you have speed traps, unmarked cars, Vascar, equipped vehicles, who would chase the automobile down the road so any vehicle coming down the highway emitting excessive noise be stopped for the punitive measures taken against him. Would you approve of the approach I think Connecticut is making along that line?

Professor OLPIN: Yes, I think so. I think all of us, we may get a little angry, but I think that maybe is the price we have to pay. I think it's just as appropriate for noise as it is for speed. I think it's an entirely appropriate approach.

Incidentally, going back to my remark about the transistor, I guess I stated that because, as Mr. Meyer indicated, I do have some strong philosophical convictions about that. I'm not only a teacher of environmental law, but I teach in constitutional law in the area of individual rights, and I get concerned when we become uniform, when we lose our plurality and our diversity, and I guess I'm genuinely concerned that we leave maximum freedom for individual expression of all kinds, but John Stewart Mill do a very nice limit on that, that we ought not be able to tell people what's good for them simply because it's good for them. If a man wants to put the transistor in his ear, I don't think we have any business telling him not to do that, but we cross into a different arena. When he inflicts that noise upon others, since there is harm being done to others, I think society has a legitimate role to play.

Dr. MEYER: That was very well said, sir. I certainly appreciate having that in the record.

Any other questions or comments, panel?

(No response.)

Dr. MEYER: Well, I certainly appreciate your statement, sir, and it does give us some food for thought in several areas. Thank you very much, sir. Hope you're going to stay for most of this. I think you'll find it interesting.

Professor OLPIN: I'm going to try to stay. Thank you for the opportunity to appear.

(The following is a written statement submitted by Professor Owen Olpin: "The recent congressional decision to go on further on the SST was a significant victory for environmental values and some other values as well. Not too long ago Americans would never have hesitated to pay whatever price was required to be first, fastest, or biggest. At last we seem to be reconsidering priorities and working toward realization of important human values as well as raw scientific and technological achievement. In fact we are starting to redirect science and technology to serve and protect human values to a much greater extent than we have heretofore.

"The SST decision was, among other things, a great victory in the battle for peace and quiet. What is now needed is many smaller and less dramatic victories in the effort to reduce the cacophony of sound that assaults us from all sides. Experts tell us that the general background level of sound in the United States has been rising at the rate of one decibel per year. The nature of sound is such that an increase of six decibels represents a doubling of impact. This means that the impact of sound in our society is doubling every six years.

"Although the problem confronts us from many quarters, the focus of my remarks will be limited to the noises of transportation. I will leave to others to deal with the noise problems of industry, the home, and elsewhere.

"Much and perhaps even most of the offensive sounds in our world today come from transportation—from cars, trucks, and from airplanes. Engine sounds from vehicles have been for years 'controlled' by devices whimsically known as mufflers. The market, however, has not provided the incentives that have been needed to bring about any substantial improvement in muffler technology and, accordingly, very little has been done. The advertising of the automobile industry makes clear that its focus on the noise problem has been elsewhere. The aim has been to protect the motorist from noise pollution by enclosing him inside the car with the windows closed. The tools have been the air conditioner, the radio and a sealed cubicle of space. This approach is very revealing. From what sounds outside the vehicle is the motorist being protected? The answer is, of course, primarily from the noises generated by his own and other vehicles on the highways. But those on the outside of the vehicle and near the highways should not be required to enclose themselves in air conditioned metal cages to avoid being assaulted by noise.

"A large part of the sound of the highways is the sound of wheels rolling on the surface of roads. We have been conditioned to accept this noise as the unavoidable price we must pay for the convenience of modern transportation. But is this really so? Is it clear that there is no technology that can reduce or control this source of noise? We should be unwilling to accept any contention that this is an insolvable problem; too many insolvable problems have been solved when the necessary pressure is applied or when the market has promised adequate rewards for the solution. We have today neither the pressure nor the market incentive. The task before us is to create both.

"An obvious partial solution lies in measures to assure that presently available technology is fully utilized. In the case of mufflers or other vehicle sound controlling equipment, this can easily be made a part of existing licensing and inspecting procedures. Our laws should be made firm in requiring that licenses be denied any vehicle not equipped with adequate sound control equipment. Periodic safety inspections should include inspection of this equipment and approval should be denied to any vehicle not equipped with adequate, properly functioning sound control devices. This can easily be weaved into the fabric of Section 210 of the federal Clean Air Act providing for support to state auto inspection systems. With rigorous enforcement through licensing and inspection. Most of the immediate vehicle problem could be reduced to unlicensed vehicles and vehicles altered (intentionally or otherwise) after licensing or inspection. This would greatly reduce the noise output and also the magnitude of the law enforcement problem in apprehending and dealing with the violators.

"A special problem is posed by noise generated by recreational vehicles. Some seem to believe that more sound means more power, and appetites for both sound and power seem considerable. The cities and countrysides reverberate with the revving of engines and the screeching of tires. Motorcycles, dunebuggies, dragsters, and snowmobiles appear to be manufactured and operated with a purpose to maximize sound production.

"The tragedy here is that the thoughtless, selfish few are permitted to mar the environment of the many. Clearly there is available technology to muffle most of the sound now generated by recreational vehicles. Up to now, however, we have not passed laws or enforced laws or otherwise demonstrated the will to tackle the problem. During this past summer a Salt Lake newspaper editorialized against thoughtless nocturnal motorcyclists and then concluded that there is really nothing that can be done. Readers were urged to perservere until the winter ice and snow forces motorcyclists from the streets. The editorial saw no other hope to protect citizens from these assaults.

"But there are courses available which are viable and relatively easy to administer. These are in the same licensing and registration processes that apply to nonrecreational vehicles. Laws on licensing and inspection should be extended to cover any recreational vehicles not now covered and stringent noise control requirements should be imposed.

"Many of our complex environmental problems require the development of new technology. In the specific instance of recreational vehicles, however, technology exists which is not being used. While efforts should continue to improve our capacity to control noise, the first effort should be made to require the use and application of the capability we now possess.

"Title IV of the Clean Air Act provides for a beginning in the battle against unwanted sound. Authorization is provided for $30,000,000 to begin to identify causes and sources of noise and to learn of the damage and injury which results from noise. No part of that money is allocated to the search for cures. Concrete proposals looking toward cures should be made by the Environmental Protection Agency at the earliest possible moment. Of course, it is necessary to adopt laws and rules and regulations which will impell the transportation industries and the consumers of their products to shoulder their share of this burden. Another proposal that should be considered is to use in this effort part of the substantial resources of the Highway Trust Fund. An attempt should again be made to utilize the Highway Trust Fund to pay for all of the costs of highway transportation. This includes air pollution, land pollution and noise pollution as well. So long as the Highway Trust Fund does nothing more than buy the land and spread the roads across it, the transportation enterprizes are being subsidized by our depleted pocketbooks and by our impaired physical and emotional wellbeing. The Highway Trust Fund represents a practical and appropriate source of support for the solution of the problem of noise from transportation.")

Dr. **Meyer**: I shall now call on Mr. Hal Weber of the Colorado Department of Health if he's here. If so, Mr. Weber, would you kindly come and join us?

Mr. Weber, I'm informed, will be here later. Therefore, I should like to ask Mr. Ray Obrecht of the National Grange, a very important organization in agriculture, to come up. Mr. Obrecht, nice to have you, sir.

STATEMENT OF RAY OBRECHT, NATIONAL GRANGE

Mr. **Obrecht**: Mr. Chairman and members of the panel. I have presented a written statement, so I'll just say a few words.

We appreciate this opportunity to appear before you, and we know this is a real concern of all agriculture. We think that it is mostly the operator of the implement that is being affected, and it does not affect very many other people. In certain areas we feel that there are some problems where the urban areas are moving out close to the farming areas, and we would like to see local controls left in these special areas so that it would not be from the Federal level regulating agriculture.

There are many advances being made in the manufacturing of implements and of tractors. They are using better mufflers. Someone said they were not, but they are. You can go back a few years when they just left it wide open, but they are trying to improve these things, and we would like to see a minimum of regulations for agriculture because in most cases it is out away from the urban areas where the big problems are.

I would like to say a little about the highway users fund. In our county every bridge in the county is marked five-ton limit, and we sure don't want to see the highway users fund taken away from the areas until the primary and secondary roads get a little of this money even for noise control. I know it's being recommended from the President right on down, but until the rural areas can get some use of this, we would like to see this fund maintained so that these 30-ton loads that's going across these bridges are not responsible for the highway users fund.

Another thing I'd like to mention, you mentioned the stockyards. The stockyards is almost a thing of the past, as you know. Chicago stockyards has just closed down, and the Denver stockyards, there's very few trucks, agriculture, going right into the heart of the city anymore. They're going to these sale rings and so on. We do have problems, and we want to work with you. When specific things come up, the Grange would like to be in the forefront to work with you to help eliminate these, but we hope that the very minimum of controls will be used in agriculture.

Dr. **Meyer**: Well, one of the reasons for having these hearings is to get every point of view possible advanced, and it's obvious that there are different points of view. My job is to get as many facts and opinions into the record as possible, so I'm glad to get what appears to be a slightly different viewpoint.

I also would like to say that our Agency intends to work with industry and with agriculture and with all segments of the public when we get around to setting standards, so certainly we will want to be working with the Grange.

Later, tomorrow, we'll be hearing from a large segment of the industry talking about what they have done. We've already had some testimony about some of the efforts that are being made to control noise from both agricultural and heavy equipment.

It would be less than fair for me, though, not to point out, Mr. Obrecht, that in testimony received from a representative of the University of Nebraska yesterday over in San Francisco, a statement was made that a significantly higher number of freshmen in the University of Nebraska coming from rural regions were showing hearing losses than those from the city. The gentleman who was presenting this information happened to be from a tractor testing station. He pointed out that part of the problem is that there are a lot of tractors around and they are very noisy, and part of this hearing loss may be from combines and tractors and other heavy equipment on the farm. So, we have got to keep this thing in proper prospective. I was rather startled.

We always think of the farm as being calm and bucolic and away from the furor of the city. Now here's some conflicting information—I've asked for more details on it. He didn't have specifics. I believe there's some people from the University of Nebraska who will testify here in Denver. I hope to get some more information on that.

I just point that out as a problem that we have to keep in mind.

Perhaps one of our distinguished panelists, Dr. Berry, may want to comment on that, but if you want to respond to what I've just said, please go ahead.

Mr. **Obrecht**: Well, I think we have moved away from the crawler-type tractors that we were using. We've gone to almost all rubber. This was a problem that we were having in running a Caterpillar all day long, but now it's all rubber, and I don't think we're having that problem. I can't quite understand this statement. It's probably true, but—

Dr. **Meyer**:—Panel on the left, any comment or question?

Dr. **Berry**: The only thing that I would offer would be the concern that farmers might have for noise level controls under the Occupational Safety and Health Act, which is 91596, I believe, where the farmer himself may not be controlled, but if he has a farm hand, if he has an employee, he would come under the provisions of this Act. He should not be exposed to excessive levels of noise unless satisfactory ear protection is provided.

Mr. **Obrecht**: Yes, we've just received these regulations. It's going to be tough.

Dr. **Meyer**: Any other comment, panel?

(No response.)

Dr. **Meyer**: Fine. Thank you very much. Wait just a minute. Dr. Fletcher?

Dr. **Fletcher**: Mr. Obrecht, I think one thing that's important for the farmers is to let them see the importance to themselves of this legislation; namely, to protect their hearing. There are rather good data showing that farmers are losing hearing from this. I know of data from Minnesota, for example, which hasn't been discussed, but the farmer himself is the loser and his worker, and it is to his advantage, and I would think that the Grange would be an ideal place to begin the education of the farmer and his family, which would include his children, to work with him, and as farms get larger and increasingly more mechanized, not only do we have tractors, but we have other aspects of farm operations, combines; some of them grind their own feed and very noisy situations. They have chain saws and similar other noise, generators, and an important part, I think, that a Grange could play would be in helping indoctrinate and educate the farmer into the problem. Once he sees the problem, I think he's going to be very happy to participate in the solutions or the various solutions of that problem.

Mr. **Obrecht**: I agree with you, sir.

Dr. **Meyer**: Before you leave, sir, I do try to interject a little humor sometimes in these things, but not because it's a facetious subject. I'm reminded of a story which has to do with the differences between the city and the country.

A friend of mine was driving a truck—happened to be a noisy truck—from South Carolina up to New York, and he was arrested in New York for driving a noisy vehicle—this was in the 1940's; even then they had some sort of muffler law—and the policeman started to tell him that he didn't know about driving in the big city. My friend replied, "Well, this may be a big city, but I come from a much bigger place." "Well, there's no place bigger than this." My friend said, "Yes, there is—the country."

(The following is a written statement submitted by Ray Obrecht: "Mr. Chairman and members of the Panel: My name is Ray Obrecht, and I am representing the National Grange.

"The National Grange wishes to thank you for this opportunity to present our views on this very important topic (noise abatement). We realize that technology exists to control almost all noises, and although I do not intend to get into the technical aspects, as I am not qualified, to say the number of decibels at which a noise becomes an environment pollution or is harmful to the human.

"As far as agriculture's machinery and tractors are concerned, many advances have been made in this direction solely for the protection of the operator who in most cases is the only one affected. In very few instances does noise from agricultural production equipment affect outsiders. It would appear that in certain instances it is possible to cut noise without too great a cost to the producer, who is going to pay any additional cost incurred in manufacturing farm equipment.

"But for the most part after as much preventative care which is not too costly has been taken to eliminate excessive noise in farm equipment, we feel at this stage in the game *agriculture should be exempt* from excessive controls, which would benefit practically no one. We wish to cooperate in every way possible, but cannot stand too much additional expense, which I am sure you realize.

"We would like to be kept informed on any definite needs on noise abatement in agriculture, and will be the first to give support when definite need is shown.

"However, the Act states that any noise standards shall be economically reasonable, technologically practicable and appropriate.

"Thus we feel the need for agriculture regulations is minor if needed at all, and should be kept at local level to meet only special conditions which might exist with special equipment.")

Dr. **Meyer**: I'll call the next witness, Mr. Jim Monaghan, representing the Colorado State University's Environmental Corps. Is he here? Mr. Monaghan isn't here.

Will Mrs. Diane Nielsen come forward? Miss or Mrs. Nielsen?

Mrs. **Nielsen**: Mrs.

Dr. **Meyer**: Mrs. Nielsen, the record will be corrected.

STATEMENT OF DIANE NIELSEN, SIERRA CLUB

Mrs. **Nielsen**: I apologize to you and to Dr. Olpin. I have to read my statement. I cannot speak extemporaneously, and I was just asked to testify last night.

Dr. **Meyer**: That's all right, Madam. We don't care if you read it as long as we hear what you have to say.

Mrs. **Nielsen**: One measure of the success of a modern advanced civilization is the amount of noise its inhabitants must withstand.

Cities are a nearly constant source of noise with unending traffic, construction and industry. The surrounding countryside no longer provides an escape because one is pursued by traffic, both on land and in the air, with various kinds of noisy rural industry and construction projects.

Now our last quiet refuge from noise—the forests and mountains—is being invaded by relatively new manaces—the snowmobiles, trail bikes, et cetera. Like motorcycles, these machines seem to be designed to produce as much noise as possible, perhaps enhancing the driver's experience, but destroying one of the most important values sought by the traditional visitor to the wild country, and that is silence.

The effects of the snowmobile noise is also destructive to our wildlife. They tend to drive game animals such as deer, elk and antelope away from the normal winter range, whether by deliberate pursuit or by fright from the noise. Heavy use in a given area by these vehicles means that our wild animals will abandon the area that they had been using for many years, thereby resulting in a change in the ecological balance of the entire area, which could result in a bad effect on the total environment.

Intrusion of noise spoils the wilderness for those who go there for peace and quiet.

I have given this testimony, not as an "expert witness," but as a member of the Indian Peaks group of the Sierra Club and as an individual who loves the wilderness.

Dr. **Meyer**: Well, one of the purposes of this hearing is to get views not only of experts but of those who are affected by what experts do.

I happen to have a member of the panel, Dr. Fletcher, who has been working under a contract to our Agency on this very question. Perhaps Dr. Fletcher might make a comment.

Dr. Fletcher: We're finding suggestions in the literature which again are somewhat less than scientific in nature, but we are very much open to any input from groups such as yours which would help us get more scientific data. There are, indeed, suggestions that there are effects we hadn't really been able to anticipate on our wildlife and effects which our knowledge of humans would not necessarily allow us to predict, and so in order for EPA to better advise the Congress in areas of this type, we are trying to accumulate data to allow them to make more considered judgments in this area, and certainly from organizations such as yours we would hope to be able to either get directly scientific level data or perhaps if you have knowledge of such data which we could incorporate in our summary to Congress.

Mrs. Nielsen: I certainly will investigate that this afternoon.

Dr. Meyer: Mr. Norton, do you have a comment?

Mr. Norton: Just a short comment. Mrs. Nielsen, I appreciate your being here to offer this testimony. I would like to make the comment so that you people today can be aware of the relative magnitude of the numbers of acres of wilderness or non-wilderness that we have in this country.

It turns out that we have something like 11 million acres preserved as wilderness now which we consider as sanctuary. This amounts to about four-tenths of one percent of the total area in the 50 United States. Fewer people are aware of the fact that we have paved asphalt and concrete on an estimated 35 million acres in this country. So nearly three times as much land area is already given to the vehicle as it is preserved right now as a sanctuary from noise.

Dr. Meyer: I'm glad you interjected those statistics, because it certainly helped put it into a very good perspective.

Any other comments on the right?

(No response.)

Dr. Meyer: Left?

(No response.)

Dr. Meyer: Well, thank you very much, ma'am. I appreciate it, and as I said, it brought out some statistics which are points on a curve we need to have. I would ask you through your organization to help.

Mrs. Nielsen: I certainly shall.

Dr. Meyer: We were talking about noise from vehicles, and although Mr. Simpson from the University of Nebraska was on the agenda for tomorrow, if he's here, it might be appropriate at this point to hear from him.

Mr. Simpson: My material is upstairs.

Dr. Meyer: We'll just hold it till tomorrow. I'd rather you do it on schedule, anyway.

Is Mr. John Green of Boulder here?

(No response.)

Dr. Meyer: Any of these people who were scheduled for this morning who, for one reason or another, can't get here, will be called later. I don't want to deny people who have indicated they want to talk the opportunity to do so.

Is Mr. Michener, Bob Michener, here? How about Dr. James Wright from the Balarat Center for Environmental Studies?

(No response.)

Dr. **Meyer**: Well, all right. How about Mr. Ahrenholtz of the Colorado Farm Bureau?

(No response.)

Dr. **Meyer**: Well, these are people who are scheduled for the afternoon. Is Nick Pohlit here from the National Environmental Health Association?

(No response.)

Dr. **Meyer**: Professor Yoerger of the University of Illinois? Would you like to talk now, or would you want to wait till tomorrow, sir?

Professor **Yoerger**: I don't have my statements.

Dr. **Meyer**: I'd rather wait then. I'm going down the list of the folks who are scheduled, and if none of these people are here, we'll take about a 15-minute recess and see if they are here then. If not, we'll recess for lunch and reconvene a little earlier.

Is Mr. Tom Logan of the Bureau of Reclamation here?

(No response.)

Dr. **Meyer**: Mr. Million?

Mr. **Million**: I'm here, but we've declined to testify at this time.

Dr. **Meyer**: I see. Be happy to have you.

Mr. McGregor of Engineering Dynamics or Mr. Hill of the Colorado Wildlife Federation?

(No response.)

Dr. **Meyer**: Well, I will recess this hearing for approximately 15 minutes, at which time we'll see if some of these folks have arrived. If not, we'll then continue the recess until 1:00 o'clock and reconvene then. We will reconvene at 11:15.

(Whereupon, a recess was taken.)

Dr. **Meyer**: At this point I should like to invite Mr. Hal Weber of the Colorado Department of Public Health to appear, sir. Would you come join us, sir, and sit down?

Mr. **Weber**: Thank you.

Dr. **Meyer**: You may proceed, sir.

STATEMENT OF HAROLD WEBER, COLORADO DEPARTMENT OF PUBLIC HEALTH

Mr. **Weber**: I'm going to be speaking to the point of hearing impairment in the school age population as measured within the program of the State of Colorado Department of Public Health.

Since 1956 the Colorado Department of Health has had a hearing conservation program designed to identify school age children with hearing problems, supply expert medical diagnostic and treatment services and habilitation or rehabilitation services for youngsters with sufficient needs.

By 1960, we had developed a system of data collection which included detailed information of the kinds of hearing problems found in Colorado's school age children. In 1967 we published an article in the *Journal of Speech and Hearing Disorders*, (Nov., 1967, Vol. 32, No. 4) which is a Journal of the American Speech and Hearing Association, and our article described selected data collected on 1,000 children with hearing loss found in 10 selected counties in Colorado during the five-year period of 1960 to 1965. The 10 counties represented areas from mountain and plain regions, and of low, medium and high income per capita groups, and in both urban and rural areas.

The study disclosed the following startling statistics:

30 percent of all hearing loss in children in these 10 counties were the characteristic noise induced-like notch. Now, this is not 30 percent of the children. This is 30 percent of a hearing loss in that thousand group here.

63 percent of the noise induced-like loss first appeared in the junior-senior high age group.

8 percent of those found with noise induced-like hearing loss suffered progression of greater than 10 decibels sometime during that five-year study.

Of this 8 percent that progressed, 88 percent had occurred in the junior high and high school age groups.

Of the 1,000 cases studied, 249 males and 51 females demonstrated this noise induced-like pattern, which is five times as many males as females. Although the exact figures are unknown, the vast majority of junior-senior high students with this noise induced-like loss reported temporary hearing loss and/or tinnitus associated with shooting, exploding of firecrackers, and/or the operation of farm implements.

An examination of Sample A attached describes a breakdown of the kinds of hearing loss found in 925 children of this study. The other 75 youngsters had different hearing loss characteristics and were not included in this pattern, but if you'll glance at it, the first column, the darkest column, represents the age at which youngsters were first found with a conductive hearing loss. This is a kind of loss you may be aware is the kind of thing that's related with a snotty nose and so on, bulging eardrums, et cetera.

If you glance at this first column, you'll see that as a youngster grows older, the incidence of this kind of problem is reduced. The center column is a sensori-neural hearing loss excluding the 4,000 cycle spike characteristics, and you see that that remains relatively stable through the early years in school and then also begins to decrease, but when you glance at the noise induced-like characteristics—

Dr. **MEYERS**—Could I interrupt?

Mr. **WEBER**: Yes, sir.

Dr. **MEYER**: Some of the panelists don't have a copy of that. Do you have some?

Mr. **WEBER**: I had 35 which I passed out.

Dr. **MEYER**: Jack, will you get us copies of this witness' statement?

Mr. **HARDESTY**: Yes.

Dr. **MEYER**: Could you hold just a minute, sir?

Mr. **WEBER**: Sure could.

Dr. **MEYER**: What you're saying is reasonably important.

Mr. **WEBER**: In essence what I'm saying at this point—and I'll go back over it when copies are available—is that out of all of the hearing loss that we measure from pre-school youngsters all the way through high school, this is the only kind of hearing loss that increases in incidence with age.

Sample A is about the fourth page back.

Dr. **Meyer**: All right, sir. Go ahead, sir.

Mr. **Weber**: Okay. I point out again that the conductive losses represented in the first column—you can easily see how this decreases with age. The sensory-neural hearing loss, excluding the noise induced-like characteristic, stays relatively low and decreases.

However, the noise induced characteristic increases with age with a rather sharp jump at the junior high age group and then continues up into the senior high age group.

On Page 1 and 2 are the statistics I read of 30 percent of all the youngsters here with this particular characteristic, 63 percent first appearing in junior high-senior high. 8 percent of those progressed in that five-year period. Of those that progressed, 88 percent progressed in junior high and senior high. There were five times as many males as females.

Now, in the middle of Page 2 is where I'll be reading now.

We examined data for three counties of different regions and different excessive noise exposure opportunities. Jackson County is a high, mountain county whose major industry is raising beef cattle. In this area big game hunting is an avocation in which junior high and senior high boys are highly active. Baca County is located on the eastern plains in the heart of the Kansas-Colorado Wheat Belt. Here many of the junior-senior high boys operate heavy farm implements.

However, just talking a few moments ago, a lot of these guys are also shooting Canadian geese when they get a chance.

Huerfano County, in south-central Colorado, is an economically depressed area in which limited small farming and light industry is found. Shooting is not a popular sport in this area because of financial limitations. Sample B presents statistics for these counties.

This represents the number of children with hearing loss in Jackson County, one where big game hunting is frequent, 96 youngsters there. Baca County, where farming, driving of heavy farm equipment, is prominent, 88 youngsters. Huerfano, 99 youngsters from this particular study.

The number of youngsters and the percentages of youngsters, looking at this, is the percentage of youngsters with the noise induced-like loss. Up in Jackson County, 60 percent had this characteristic; nearly 41 percent in the Baca County area, and only 21 percent in the area where little noise exposure has an opportunity to create some problems with hearing.

I'm going to digress from the testimony here for a moment and speak to the point of firecrackers which, it seems to me, is an area in which the Federal Government could create a good deal of impact. In one of the counties just south of Huerfano County, another very depressed area, during the period of time of this study of '60 to '65, 22 percent of the youngsters had this noise induced characteristic. Two or three years ago outside of one of the largest communities in the county, a firecracker stand was made available, and firecrackers were available throughout the year. The last study in that particular area now finds 37 percent of the youngsters with noise induced-like hearing problems. Many of the youngsters that we see in our audiological clinics throughout the state—saw one just last week, two youngsters, up in Leadville, Colorado whose ears have been ringing since the last 4th of July.

Now, there are in many states and many communities some regulations denying the opportunity to explode firecrackers, but they're available. I would think that the Federal Government may assume some posture here in terms of making any explosive firecrackers unavailable to our youngsters.

Since this study and its reported findings in '67, the State Health Department has undertaken strenuous programs to educate the community to some specific relationships between the high noise levels and hearing. I have one sample of a news blurt that went to nearly every—it was published in nearly every newspaper in the state; that was back a few years ago, but we're attempting right before hunting season—we were attempting to counsel the hunters to at least while they are zeroing in, for the kids shooting at whatever they're shooting at, that they should be using some earplugs.

If you look at Sample D which follows, every child that we find every year that has this noise induced characteristic receives a copy of a letter like this. His family physician is informed of our findings, and we individually and as groups speak with the junior high and senior high kids that demonstrate this, counseling them against the dangers of recreation and agricultural noise to their hearing.

One other point which is not mentioned in the testimony here is the State Health Department in Colorado issues in the neighborhood of 400 to 450 pairs of earplugs to these youngsters as we find them and they attend the audiological clinics.

I appreciate this opportunity to direct your attention to the fact that high noise exposure problems reach into the very early ages of life. It's tragic to note that here in Colorado between two and three percent of our new voters have some noise induced hearing loss before they will have an opportunity to cast that first ballot.

Dr. **Meyer**: That last comment is certainly a very startling observation. Before making a comment of my own, I'll ask on the left, any questions?

Dr. **Fletcher**: Have you considered testing hearing at higher frequencies than you have probably covered with conventional audiometers for the purpose of detecting these losses earlier and, therefore, possibly getting these children to be aware of the beginnings of hearing loss before it gets down into serious problem areas for speech and so on?

Mr. **Weber**: Yes. There's a characteristic hearing pattern that seems to occur with the noise induced type losses which differs from other high frequency type hearing losses. The spike that you often hear talked about, 4,000 hertz spike, sometimes it's deepest area is at three, sometimes at six. If it's noise related, it recovers in the frequencies of six to 8,000 hertz. Now, there are new high frequency audiometers that are being made available. I suspect that what we're going to be measuring with that is not so much noise related hearing problems as other factors.

Dr. **FLETCHER**: I think you're wrong. I've been doing some rather extensive research in this area, and it seems to be predictive of encroachment into all frequency areas of hearing loss which is why I would recommend it to your examination.

Mr. **WEBER**: There is some recovery in the neighborhood of 8,000 hertzes when the dip will appear again.

Dr. **FLETCHER**: Particularly with impulse noise, which you have stated to be a rather predominant factor in this particular area, you will find that you will find losses anywhere from 14 to 18 kilohertzes which would not be apparent at lower frequencies and would be highly suggestive of susceptibility on the part of a person having the loss.

Mr. **WEBER**: Could well be. There was a study that was carried out here in city schools in Denver some time ago. I question a good portion of that study, however, but if there is some kind of relationship that does exist, we're now finding three percent. If we have to find more, we'll search for them. I hope it's not there.

Dr. **MEYER**: On the right? Mr. Botsford?

Mr. **BOTSFORD**: I think it's very commendable that you are using the results of hearing studies of school children to practice preventive medicine; that is, through making press releases and through sending letters to their parents in an effort to head off any more of this as much as possible.

I have two comments. With regard to the noise of firecrackers, the Food and Drug Administration has established limits on the amount of noise that can be made by firecrackers and cap pistols and other kinds of explosive toys, and this has been published in the Federal Register, and it sets a maximum amount of noise that is considered not harmful.

The other thing is we at Bethlehem Steel have for more than 20 years been doing hearing tests as part of our employment physical examination, and our doctors, our industrial physicians, tell me that in recent years they have noticed in young applicants this pattern of early noise induced hearing loss that you've found in school children. These would be people just out of high school, many of them. And they think that maybe loud music and motorbikes and other sources of intense noise besides the ones that you've cited may be a factor in here.

Now, in your table you cited where you showed a decreasing incidence of sensory-neural hearing loss with affluence. I think you would have also a decreasing number of snowmobiles and motorbikes and possibly loud hi-fi sets. So that could also be a factor in those statistics.

Mr. **WEBER**: It may well be. Colorado now is inundated with the snowmobile, as you may suspect. They are very, very loud. This information from 1960 to 1965 does not include the snowmobile. This was pre-snowmobile days, and to some extent hard rock wasn't as popular during this period of time. I suppose I'm wrong. There's a lot of positions I take which are not the popular positions, but I really feel that the impact noises, the noise of greatest danger, particular with these kids, one shot can create some permanent loss.

Whereas if you look at Walsh-Healey and the recommendations of noise level exposures, the surprising statement that one must have—if he's exposed to noise levels in various categories, high noise levels, one must have his hearing examined once a year which—now, these are by and large the continuous noise exposures that are being spoken to here. I suspect that perhaps there is an additive factor of listening to the hard rock, of driving the sports cars, of driving the snowmobiles, et cetera, but I think it's going to be extremely difficult to document that. I don't know how it can be done.

Dr. **Meyer**: You're, in fact, answering a question which was just handed me about the effect of hi-fi exposures, particularly, say, dances and discotheques, with noise levels of 110-120 dB(A). Let me interject a couple of thoughts on this, and then you may continue.

One, everything you've said here so far and what the panelists have said has been borne out by testimony we received both in Atlanta from the audiologists from the State of Georgia and also from Dr. Meyer Fox in Chicago. I believe some of the members of the panel and yourself will recognize Dr. Fox's credentials in this area. One of his colleagues presented some information which, strangely enough, pointed out that a lot of children even in Chicago, particularly in affluent areas, do shoot shotguns, do shoot off firecrackers. Dr. Fox's associate pointed this out to be a major source of hearing loss. He seemed to feel, however, that his studies and others did point out that an hour or two hours of continuous exposure everyday to 120 dB(A) of hard rock music was definitely a factor.

He also pointed out some other things. I just wanted the record and particularly the people here to be aware that you find some very startling problems, such as mothers having their small children in a Volkswagen, sitting over that shelf which is a source of noise. Most people are pretty indiscriminant in exposing their ears to these intense sources of noise.

The next question I wanted to ask you is whether you are continuing the documentation that you've presented? You mentioned 1960 to '65. I think it would be very important to depict any changes in these trends, because clearly it's a very significant environmental problem.

Mr. **Weber**: No question about that. We do continue to record the information. Jackson County back in 1960 to '65 had 60 percent of their youngsters with this kind of loss. I just returned from that county yesterday and find now 24 percent of the youngsters with this kind of hearing loss. This is a community that has taken seriously the efforts that we've put forth in terms of trying to conserve the hearing that's there.

Speaking before about the use of the VW, et cetera, I'm an animal that drives 25 to 30,000 miles for the State of Colorado every year. I have earplugs that I wear in the vehicle—it happens to be a VW—all the time. I've passed out probably 50 earplugs to friends who travel by plane considerably around the country.

I'm convinced that part of the so-called biological block screw-up that one experiences from flying deals with the noise exposure the individual has been subjected to.

Dr. **Meyer**: I have one last question. Then we'll move to the next witness.

Mr. Weber, one of the participants here has directed a question which I think is worth directing to you and also to people on the panel. The question is whether Dr. Weber noticed any effect in men of post-Army age? Do the armed services play any significant role in hearing loss in the male population?

Mr. **Weber**: Well, our program has been by definition child health services. The State Health Department limits us up to age 21. We don't see these post-military people. The VA, I'm sure, would have some information for you on this. However, as I understand it, if a youngster has as much as a 45 decibel spike noise induced characteristic in one ear, he is no longer acceptable as a 1-A candidate for the military service, and there's a lot of these youngsters that have this before they're eligible for the draft.

Dr. **Meyer**: Would you like to comment?

Dr. **Fletcher**: Well, in partial answer to that question about contributions of the Armed Services, the latest figures from the Veterans Administration—which are about five years old—they're rather reluctant to put these out for several reasons. It takes them awhile to get them. Then they have to look at them very closely to sort out medical reasons as opposed to noise induced reasons, but it would appear that probably—and you recognize these weasel words—there are some 50,000 veterans getting some 100 million dollars a year in compensation for noise induced hearing losses as a function of the military service, and this is exclusive of the costs of outpatient treatment, hearing aids, batteries, et cetera, and exclusive of diseases of the ear, and it has been suggested that this will probably increase at a rate of about eight percent a year, so it's a very serious problem.

The military recognizes this. The Air Force has their 160-3; the Army has its Regulation 40-5, all of which are addressed to this problem of minimizing the losses by persons in the military. It is a significant contributor to hearing loss in our society, as are the contributions from industry and recreation and so forth.

Dr. **Meyer**: Any comments on the right?

Mr. **Strunk**: Dr. Weber, I didn't catch the age group of the children that you have studied, and it appears that this may be an important factor in the statistics in Table 1 where it may be that very young children do not actually drive the farm implements or shoot guns.

Mr. **Weber**: Table 1, you'll see the numbers underneath the columns. This is the age group of the youngsters that had identification, six to seven, eight to nine. We have a three to five. This represents a certain population that were referred in to our audiological clinics. Are you speaking of the bar graph?

Mr. **Strunk**: Yes.

Mr. **WEBER**: Yes. The pre-school population aged three to five represented youngsters who were referred in to our audiological clinics by physicians. We did not at that time have an active fact-finding program. Generally speaking, the 30 percent number seems to hold true in our last fiscal year's numbers, one or two percent difference one way or the other. It looks pretty much as if it continues to exist.

Dr. **MEYER**: Mr. Norton?

Mr. **NORTON**: Yes, a point of clarification, Mr. Weber. Did I understand you to say that a single one shot exposure to an explosive noise source can result in impairment?

Mr. **WEBER**: That's been documented in the literature.

Dr. **MEYER**: Fine. Well, thank you very much for a very constructive presentation.

At this point I should like to ask Dr. John Spechko if he would come forward. Let us hear from him. Dr. Spechko?

STATEMENT OF DR. JOHN SPECHKO, RUPP INDUSTRIES, MANSFIELD, OHIO

Dr. **SPECHKO**: I represent Rupp Industries of Mansfield, Ohio, manufacturers of recreational vehicles.

Dr. **MEYER**: Would you mind pulling that a little closer to you so we'll be sure and hear you?

Dr. **SPECHKO**: If the Chairman would agree to this, I'd like to present two viewpoints, one for my company and one for myself.

Dr. **MEYER**: Certainly. Just be sure we know which is which.

Dr. **SPECHKO**: I do not have any written literature because of the short time I had to prepare this.

Dr. **MEYER**: All right.

Dr. **SPECHKO**: My company is particularly concerned with the Sub-Council Report of the National Industrial Pollution Control Council of May, 1971, and my company's viewpoints would be directed to this publication.

It states here ". . . that the noise nuisance factor from recreational vehicles and powered equipment is infinitely less a problem in either an urban or suburban environment than are other common everyday noises caused by buses, trucks, airplanes, trains, construction, road repairs, and even automobiles." Now, the proposed sound level limits for these recreational vehicles proposed by this Committee are such that we would be infinitely quieter than any of these suburban vehicles. In fact, if we take the snowmobile proposed level for 1983, this is 70 dB(A), and it represents a 98 and a half percent reduction in the sound energy from that vehicle. The motorcycle, however, which is an urban-suburban noise nuisance factor has only been brought down to 77 dB(A). Now, we don't even know whether we can meet 70 dB(A). There isn't enough research on this subject, and we don't think it's feasible for this Committee to put these goals down here. We think a lot more research is needed, and this ought to be a step by step program.

Also we disagree with the differences in the various vehicles' proposed sound levels. For instance, the snowmobile operator noise level is proposed to be 95 dB(A), and for a motorcycle, 240 cc's, it's proposed to be 100 dB(A). Snowmobile use is a lot more restricted than motorcycle use, and honestly, we understand why these differences should exist between certain vehicles.

Also the method for testing the noise on a snowmobile is maximum acceleration on grass, which is not its natural environment. If you test it on snow, you can get up to a 5 dB(A) reduction on the same vehicle so that this 70 dB(A) becomes lower. It could mean that some snowmobiles are as low as 65 in the snow. Unfortunately, this is the only test method available at the present time.

We would like to see a lot more research, more detailed test procedures laid down, and you will hear probably more about this from other snowmobile industry representatives either today or tomorrow.

Dr. **MEYER**: Yes, we have several testifying tomorrow.

Dr. **SPECHKO**: Basically we agree with most things in the report, and we would like to see particularly Federal legislation. Right now I'm in charge of noise levels on the snowmobiles and recreational vehicles, and we have a tremendous headache just trying to keep track of who is doing what. We have various laws. Some are very easy to meet, and some are so ridiculous that we cannot see how it becomes law. We would like a Federal level to sort everything out. I think that's just about all that we disagree with in that report.

For myself—and this is purely a personal viewpoint now—on the subject of wildlife conservation, I think that recreational vehicles are only a small problem compared to the massive pollution by industry and general transportation. I personally would like to see areas set aside basically for recreation such as we have areas set aside for wildlife. I would like to see all these areas expanded so that people can go out and enjoy themselves in the countryside in whatever vehicle they choose without having to endure massive traffic in the woods or on the prairies or in the mountains.

Obviously this would involve a large amount of expenditure, but I think it's the Federal Government's duty to provide recreation for this country. I myself like to ride trail bikes and snowmobiles. When I go to my local state park, all I hear are trail bikes all day long. However, this problem has been solved in the State of Ohio by closing all the state parks. Now, this obviously is not the way to go. So I think that the Government should provide revenue or financing from revenue from taxes, license fees from vehicles, admission charges to parks and recreational areas to provide for increasing leisure activities and increasing leisure time amongst its citizens.

Dr. **MEYER**: Thank you very much. You've raised some very interesting contradictions. I'll start off on my extreme right with Mr. Norton who represents a very vigorous concern for the environment. Mr. Norton, do you have any comments?

Mr. **NORTON**: Yes, I have a couple of questions, perhaps mostly for clarification. Did I understand you to say that you feel that recreation noise is less of a problem than other suburban noises?

Dr. **SPECHKO**: It says in the report it is infinitely less of a problem.

Mr. **Norton**: Let me proceed on that point then. In what way do you feel it's less of a problem?

Dr. **Spechko**: I do not feel—Im merely stating—

Dr. **Meyer**:—Let me clarify. He's citing a sub-committee report of the National Industrial Pollution Control Council, sometimes acronymously known as NIPCC, Report, which is a council appointed by the President dealing with a variety of industrial problems. It is merely a summary of information.

As an example, it contains a series of recommendations, and I'm now referring to the NIPCC Sub-Council Report of May, 1971, concerning the snowmobile. They figured that by 1970 the noise level from 50 feet should be 88 dB(A) as measured on the A scale, and by 1983 it should be 70 dB(A). It's an analysis of the problem and a statement of what they think is feasible.

In it they do make the statement that in the gross order of magnitude of what national noise energy will release, if you'd use that as a phrase, that the total program is less. That's not saying whether the impact is less.

Mr. **Norton**: That's my point. I guess I was trying to get at the question of impact, because certainly physical damage to the individual external to the vehicle may be reduced over suburban noise levels, noise problems. The impact of these devices may be greater. Many people go to forest type environment for quiet and are subjected to sometimes shockingly high noise levels.

Dr. **Spechko**: Personally I couldn't agree with you more, but my company feels that we are not one of the major sources of noise annoyance in this country. There are far more bigger things than this, but the industry as a whole is not against noise reduction whatsoever, and in reply to an earlier speaker, we do not try to make them as noisy as possible. If we did, we could do a good job of it.

Dr. **Meyer**: Mr. Norton, do you have another question?

Mr. **Norton**: Yes, with regard to the statement made that recreational vehicles represent really only a very small problem in wildlife concerns. I wonder if there are many wildlife experts who would agree with that.

It's my understanding from talking with some of these people that there is a growing concern about the effect of recreational vehicle noise on wildlife in general. I'm not talking now about deliberate attempts of recreational vehicle users to chase wildlife. I'm talking about simply the intrusion of vehicles into the domain of wildlife in the winter especially.

Dr. **Spechko**: Well, now we raise a problem what is the domain of wildlife? To me it should be the whole country, and few take that into consideration, and industry and transportation far outweighs recreational vehicles.

Mr. **Norton**: You may be right that it should be the whole country, but, in fact, it is not, simply because we've done so much to the nation in general.

Dr. **Spechko**: Well, let's start there and make it a bit bigger, the part that we have got for the wildlife. That's my point.

Mr. **Norton**: I don't understand. Would you repeat that?

Dr. **Spechko**: Well, we've restricted wildlife to certain areas. It just so happens that these are areas where people use recreational vehicles occasionally. I'm not saying that this is right or wrong. I'm saying that we should have more area for wildlife. It's being driven from the vast majority of this land. Let's start getting it back into places where it isn't there now.

Mr. Norton: It's going to be awhile before we have elk in downtown Denver.

Dr. Meyer: Any other questions on the right?

Mr. Strunk: I would like to make just one comment, that snowmobiles, of course, do not have to meet the lowest noise limit. I think lawnmowers and riding tractors are required to meet a lower limit than snowmobiles.

Dr. Meyer: On the left, gentlemen?

(No response.)

Dr. Meyer: Well, one question I'd like to address to you is this. There have been some people talking about pollution charges. We had a very interesting proposal presented in San Francisco yesterday. Maybe what we ought to do is set standards because setting standards will arrive at a certain level, but then communities may want lower levels that can be created by use restriction. The proposition was advanced that even if you have your snowmobile built down to 88 dB(A), that still might be very offensive to certain park uses. The proposal was advanced that for every 5 dB(A), say, over a certain established figure—for this example, let's say 50 dB(A)—a $10.00 charge would be placed on the excess decibels just to enter the park or recreational area.

Even if you're willing to pay the price, this still would not preclude the park or somebody else with properly constituted authority from restricting the use in prescribed areas.

What impact do you think that would have on the industry moving towards trying to reach even quieter standards?

Dr. Spechko: Well, the industry right now is working flat out to meet present standards for the next year, and obviously we're going to continue to reduce the sound level, but how can we go about it without going to astronomical costs? If you want a snowmobile to be as quiet as a Cadillac, you'll have to charge the same price.

Dr. Meyer: I just wanted to get your views on this.

Were there any other comments?

Mr. Botsford: I see a parallel here with the outboard motor which, when I was a boy, was just as noisy as snowmobiles are today, but the ones I have heard lately aren't offensive at all, and I think they've done a remarkable job of quieting them. They have a two-cycle engine just as most snowmobiles do. I believe similar things could be accomplished.

Take, for example, in the table you referred to, they proposed a limit of 80 decibels on the A scale for boats in 1970, but 88 for snowmobiles, and I think that represents a gap in the application technology.

Dr. Spechko: Well, no disrespect, sir, but it's been a long time since you were a boy, and we've had a long time to work on it. We're a very new industry. This thing is going to take time. How much time and how low we can get, nobody knows.

Mr. Botsford: Well, the point I want to make is a two-cycle engine has been worked on from the noise viewpoint for a number of years, and I think that that technology is not being applied as far as snowmobiles.

Dr. Spechko: Perhaps most of it is inapplicable to snowmobiles. One of the greatest reasons why on outboard motors it's required is they exhaust under water.

Dr. Meyer: I'm sure we're going to have a great deal more on this with some representatives of other elements of the snowmobile industry tomorrow. Thank you very much, sir. We want to get everybody's views, and I'm determined to be sure the record shows these differences of opinion so we can make proper judgments.

Dr. Berry: I'd like to ask the witness one question as to the reaction of the users of your quieter prototypes. I'm thinking of research and development. Undoubtedly you would have somebody who has tried them, and this would be in relation to the theory that some people hold that you want power, you want noise, you want that feeling of surging response to the accelerator. What has been the response of the users of your quiet prototypes?

Dr. Spechko: My own personal viewpoint is that I'm very pleased, and I would like them to be even quieter, but our test drivers who spend six hours a day driving them, they don't like it one bit. They represent the opposite view. They want their snowmobiles to go too far too fast. The average man just could not run them. That's the way they think. But I think the majority of users would welcome quiet snowmobiles.

Dr. Meyer: It seems to me if they're really interested in enjoying nature, they probably would welcome something that was a little quieter.

Dr. Spechko: If you want power, you can go to the race track and you can race snowmobiles, but I don't think you ought to subject the community to racing snowmobiles.

Dr. Meyer: All right. Thank you very much.

(The following is the written testimony submitted by Mr. Spechko after the hearing was ended.)

Rupp Industries is one of the principal U.S. snowmobile manufacturers. We are in basic agreement with the points of the N.I.P.C.C. report except for the projected sound level limits for snowmobiles. It must be noted that the National Industrial Pollution Control Council Sub-Group on leisure consists of the two U.S. outboard motor giants plus two others. These outboard people have been using their tremendous technical resources for years to reduce sound and yet they are stating that the young snowmobile industry should accelerate their sound reduction programs almost twice as fast as the outboard industry.

It must also be noted that these outboard companies who are making the sound reduction recommendations are the producers of relatively large and expensive snowmobiles which constitutes a relatively small portion of the market.

It must also be noted that in these companies the snowmobile is rather a small portion of the products on which they do sound reduction work. For years they have built up the technology and personnel to reduce noise in outboard motors. The typical snowmobile manufacturer in the U.S. does not have technical resources that in any way compares to these giants. Although Rupp's sound reduction effort and expense in no way compares to these giants, I can assure you that the ratio of effort and expense to dollar sales volume is much higher. We also know our resources and efforts are much greater than the average snowmobile manufacturer.

I do not think that we can compare snowmobile noise levels with other recreational vehicles such as motor cycles and outboard motors. I have spent the majority of my technical life involved in outboard motors I can say that the differences in the resolution of the noise problem between an outboard motor and a snowmobile are extremely different because of the availability of water for the damping of outboard motor sound.

Many people are quoting sound levels of some motorcycles for snowmobile guidelines while not saying that the motorcycle being referred to has a much easier to quiet 4 cycle engine that is not capable of commercially acceptable starting in the extremely cold environment of the winter snowmobile.

I am sympathetic with the Sierra Club and others. It is admirable that their many members want to retain our natural resources and their natural state. On the other hand we have many citizens of this country who have neither the strength nor the time to enjoy the resources as these people can. The snowmobile offers these many other people the opportunity to enjoy nature as do the young, the healthy and those with the time.

The establishment of unduly severe sound requirements does in effect ban the snowmobile or limit its use even to the affluent. Unduly severe requirements make the machine large and unwieldy so it cannot navigate well in deep snow conditions and/or makes the retail price so high that the average individual cannot afford to purchase it.

The 86 dB-A level required this year in many areas of the country, which was determined very shortly before our production designs were completed, taxed to the utmost our technical capabilities. I am sure many of our competitors, who do not have the proper technical instrumentation, are not even aware of their sound levels or ways to reduce them at this time. In addition we are finding it to be a very difficult task to accomplish the 82 dB-A level set for next year. We look at the time allowed and the parameters in which we must work in order to make a vehicle which is commercially acceptable to the consumer.

I do not feel the SAE J192 tests procedure is either repeatable or related to the actual snowmobile environment. I do not feel that the 73 dB-A in 1978 and the 70 dB-A in 1983 as related to the SAE J192 standard is realistic. I feel very strongly that an industry and government group should arrive at a new test procedure which is realistic and related to those noises which create the concern of life in the wilderness. After this is accomplished the same or related industry and government group should set new and realistic standards for noise levels.

Federal noise level standards which pre-empt state and local ordinances are advantageous for interstate vehicle use by the consumer and more efficient acoustical research by the manufacturer.

Dr. **Meyer**: At this point I'd like to call Dr. Wright and representatives whom I called a little bit earlier. Doctor, I'd be very happy to have you come forward, sir. Nice to have you here, sir.

STATEMENT OF DR. JAMES WRIGHT, BALARAT CENTER FOR ENVIRONMENTAL STUDIES

Dr. **Wright**: Thank you. I'm Jim Wright. I'm with the Balarat Center for Environmental Studies. This is a part of the Denver Public Schools, and yet I should point out that my reason for being here today is, in essence, a personal one, and having been invited to be before this group, I wanted it understood that anything that I might say is a personal view and is not necessarily a statement from the Denver Public Schools.

Our program is one that's involved with the development of an outdoor education center, and my responsibility is to work with young people in developing appropriate attitudes toward the environment and toward problems of the environment.

I think there are just really two things that I would like to stress at this particular time as far as noise and noise abatement is concerned, and that is that as we work on our outdoor site, it becomes very obvious to us that in a situation in a place where we're trying to enjoy nature and trying to instill some respect for natural things, that it is quite disturbing to have a group of young people on this site and to be trying to conduct an educational experience and to have very noisy motorcycles and trail bikes and that sort of thing race by our front gate and on the mountain roads close to where we are.

My experience with the very young child there is the same as the experience with the older child, that when this happens, when you're in the field and you're trying to develop some feeling for the natural environment, the bike comes by and it really shatters things, and so we have that problem in the out of doors there.

In addition to that, we also are aware of the problems that exist in the city with noise, and since we, too, are into the problem of developing attitudes about the way the city should be and how the city might be more of a reasonable place for man to live, that we're interested in seeing or hoping that things may happen to help reduce problems of noise in the city, and so as we work with teachers and as we work with young people in the city and around our schools, we are trying to encourage them to examine the problem of noise, to note the sources of noise in the city, and to be aware of ways in which noise in the city might be curbed.

So really my reason, as I say, to be here today is just to express those two viewpoints. I am an ecologist, but my expertise is not necessarily in the area of the effect of noise upon wildlife or anything like that, but simply from a personal viewpoint working with young children that it is a concern of theirs. It's disconcerting to be in the field and have a great deal of noise around you when you're trying to establish some feeling for nature and for the out of doors.

Dr. MEYER: Before I ask the panel if they have any questions, could I ask you a question, sir? Do you have an estimated percentage of the teaching or working time of children in which noise has been noticeable enough to cause an interference with either their ability to concentrate or your ability to communicate?

Dr. WRIGHT: I can't give you an exact figure. In most experiences that I've had in the city, it's much worse in the city than it is in our outdoor site because it is reasonably remote, although there is some traffic by. So let me address myself, first of all, to the city situation.

Many of our schools are located, obviously, next to busy thoroughfares. A school that comes to mind is Gove Junior High School near Colorado Boulevard. I have, in addition to that, been an instructor at the University of Denver, and I think it's evident there's a heavy traffic artery near some of the classrooms at the University of Denver, and in both those situations, in both those places, it is not at all uncommon, let's say, in a 40 or 50 minute classroom period to interrupt your class, to stop your class, let's say, two or three times, let's say, two or three minutes at a time, and so you're talking maybe about 10-12 minutes of interruption in a 40-minute class period day after day after day. And also in southeast Denver and in east Denver in the schools where they're in the glide path for the airport, jets in that area sometimes also interrupt the school process.

Dr. MEYER: We received testimony elsewhere that as much as 20-30 and even as much as 40 percent of teaching time has been interrupted by transportation noise or aircraft noise.

Dr. WRIGHT: Both of those are serious problems in a classroom in some parts of town.

Dr. MEYER: Dr. Berry, any comment?

Dr. BERRY: No.

Dr. MEYER: On the right, any comment?

(No response.)

Dr. MEYER: Fine. Thank you so much for coming, sir.

Dr. WRIGHT: Fine. Thank you.

Dr. MEYER: May I now call on Mr. John Green from Boulder. Mr. Green?

STATEMENT OF JOHN GREEN, BOULDER, COLO.

Mr. GREEN: Hello. I'm just here as a private citizen, and I've lived in Boulder, Colorado for five years and have some experience with their noise ordinance as a citizen of the community and also have visited the recreational areas nearby often, in the mountains primarily. At my present residence there is a large construction job going on next door which at various times has brought in very noisy equipment. Primarily this has been equipment with inadequately muffled internal combustion engines. When I have called the Noise Control Department of the city, they have asked compliance and installation of mufflers in most cases, occasionally granting short term variances.

In practice, then, I have gotten considerable relief from noise over what would have been the case with no noise abatement program. The construction equipment was usually in operation many hours or days. In the case of recreational noise sources, operation is more sporadic, and this means that noise control should definitely be part of the original design of the product. Recreational equipment is more often remote from people with sound level meters, and so standards are much harder to enforce in the field.

I am opposed to any Federal regulation causing less strict standards to be applicable than a local community should choose to apply. I understand there has been a good deal of legislation proposed with this as part of it; that is, a community could not enforce more strict noise regulation than the Federal allowances. Whereas this may be profitable to the automobile and motorcycle industry, it certainly doesn't help the local community trying to control its own noise problems.

In some cases more stringent local standards could hinder free travel of some vehicles, but it would not be discriminatory against operators of the vehicles, but only the lack of integrity of the vehicle itself in a similar vein that certain lighting is required. I don't think one need presently worry about too restrictive local legislating since most communities relish more traffic and more money therefrom; they, therefore, adopt fairly uniform standards that don't exclude very many people, who have money at least. In no case should people be subjected to injurious noise in their employment such as farm equipment operators.

When I have been in the mountains in several states, I have always been impressed by and enjoyed the quiet when man-made noise is not present. The man-made noise I ordinarily hear in the mountains is from either internal combustion engines or guns. Chain saws, motorbikes, snowmobiles and Jeeps and aircraft can all be muffled better. Personally, I do not know why people wish to ride,noisy machines in the mountains; perhaps they are scared of deer or are afraid of hearing what is going on in their own heads.

If their noise were only affecting them, I wouldn't mind; let them wear amplified headphones to hear their supervirile engines roar. When it gets in my ears, however, it is encroaching on my spiritual and physical wellbeing. I have flown light planes and suspect that much of their use could be considered recreational. This is also true of cars and camper-pickup trucks, commercial airlines and other transportation. Muffle them all better.

We know that people become accommodated to noise and have their ears degenerate and become less sensitive. The story is told of the frog which, when dropped in hot water, jumps out; if, however, the frog is put in cool water which is heated slowly, he doesn't notice the change and in time dies of the heat. I feel we may be doing the same thing with our environment; eventually we'll be deaf, not taste anything less than pepper and believe there are only 10 stars in the night sky, which is brown.

Rather than fancy, complicated specification of noise measurement that will allow loopholes for manufacturers, I suggest staying with a simple measurement like the sound level meter A scale which is integrated and weighted for the normal rather than degenerate human ear. Sticking to this simple type measurement would lessen confusion and ease enforcement.

As to rock festivals, perhaps a visual display of sound level should be provided. However, if people voluntarily destroy their hearing or eyesight, that is their choice, if they know what they are doing. We can question their judgment, but I would not regulate their behavior.

I'd like to add in this regard, which isn't in my statement here, that I was an amateur radio operator for many years and still am, and when I was 14 years old, I used to listen to radio transmissions to the point of pain in my own ears, not knowing that it could do damage. I would suggest a more aggressive education program to educate people that they may be damaging their ears, but I don't really see any way to keep them from damaging their ears if they want to.

I see the only solution to the noise problem in corporate and individual consciousness and responsibility. We live in a perilous thin space between hard rock and a vacuum and wallow in what we do. Let us do better. Let us choose a better spiritual life rather than more unnecessary enslaving noisy gadgets. Peace now.

That's my statement.

Dr. **MEYER**: Thank you very much. Any comment on the left?

(No response.)

Dr. **MEYER**: Thank you very much. Your comment with regard to the fact that *apparently* Boulder has an effective noise ordinance is a very useful thing to hear, because we are concerned with enforcement. Thank you very much, sir.

Before we adjourn for lunch, could I ask if Mr. Robert Michener is here? Mr. Michener, would you come forward, and then we'll continue after that with Mr. Monaghan and Mr. Simpson.

STATEMENT OF ROBERT MICHENER

Mr. **MICHENER**: I'll try to make this brief.

Dr. **MEYER**: Say your say. Don't make it brief on account of the luncheon schedule.

Mr. **MICHENER**: I'm limiting my comments primarily to the area of noise pollution in wild areas. I suppose most people on the panel and in the audience have had occasions to be driven to back pack into the country and into the wilderness areas, maybe just the national forest areas, and enjoy a rather bucolic scene of frequently seeing animals around, elk, deer, an awful lot of small animals and a lot of birds, even the shyer birds. However, I think that the noise is a significant problem and is going to significantly change this.

Now, my own qualifications are strictly that I'm a private citizen representing myself essentially. I've been an amateur hiker and climber for over 25 years, primarily in Colorado. I get tremendous pleasures in the out of doors. My profession, I'm a psychologist, and I work with human behavior. I've also been interested in animal behaviors at different times and the impacts of different aspects, and more recently the impact of civilization on animal behavior.

There has been research in animal behavior, and most of it seems to be primarily in the area of animal management. However, there is a growing body of work in ethology; this is how and why animals have instincts and how the instincts develop and how this relates to their development and their continued existence as a species.

Now, the impact of civilization on animals, I think, needs more formal study. However, we do know that there are definite impacts, although this hasn't necessarily had to be established by experiment and study. For instance, cutting back floors, diverting rivers and changing the water ecology has done a tremendous amount to discourage certain species and under some situations actually encourage other species. It certainly changes the whole ladder of life that exists in the food chain. Also a growing impact certainly is the heavier tourist use, and here primarily I refer to the smells and sounds and the visual contact that the wildlife have.

Now, the effects of this certainly are the changed food patterns, possibly discouraging animals in certain areas, moving them to other areas as their natural cover changes, and thus the animal populations themselves might become eliminated, might fall to lower portions or might drop out altogether.

There have been some studies suggesting on situations that actually fertility or the reproduction might be affected by some of these effects. Certainly migration is induced, and I think we can think of a number of situations here. However, with new areas coming in, there's a possibility of irritability and instability being developed in animals, and here I'd like to make reference to a book called *Night of the Grizzlies* by Jack Olson. This is essentially a study of the two attacks and the two fatalities that occurred in 1967, I believe it was, in Glazier National Park, and more recently our own man killing bear attack this summer in Rocky Mountain National Park which is referred to in the late July and early August Denver Post. There's an article on August 1 of the Denver Post that reviews black bear attacks in particular on people and a discussion of it, and reference is frequently made to people who are assessing the situation that these bears were unstable. They were definitely strange. They did not go along with the usual orientations.

I'd like to briefly say that the nature of the disturbances from the animals' point of view tend to be in terms of odors, hearing and vision, I would suppose. Now, I'm not an animal. It's difficult to know. However, the odor aspect is a strong one. I would like to suggest that this causes more caution in animals. When I moved into a valley and they've gotten my smell, they've disappeared, but they were around. I could see them on different occasions.

Margaret Altman, an ethologist who taught at the University of Colorado, did many animal studies, and it was possible for the first three weeks of her studies to get close enough to the animals to actually observe them, and during this time she had to develop essentially a body odor, and the natural body odors the animals could adapt to much more rapidly than the civilized things that keep us from being offensive to each other.

Vision is probably one of the least important senses in most animals, although it varies. A few exceptions certainly do occur. The hearing area, I think, is one that is of vast majority. I'll hypothesize and say that noises cause panic and trauma in animals generally more than odors do. Now, the basis for this hypothesis would be if anybody's been out, say, all summer and then also goes to the same areas in the hunting season, the first crack of the bullet and it's extremely difficult to locate animals; they're shyer. They migrate away and they don't move around as much.

On the other hand, you can go to a protected area like Rocky Mountain National Park and you can see the elk still out mating and tourists by the dozens driving by and stopping, odors prevailing completely.

I would like to suggest that it's primarily the sound and not the view of other animals. I don't think an animal seeing another animal being shot necessarily has a dramatic impact. You can shoot at a buffalo, and they do not even panic when another animal drops. However, I think that the gun noise is the dramatic thing. I would like to suggest that this is evidence that noise has a very deleterious effect in the back country. With the heavier back country use by recreational vehicles, primarily mechanized vehicles, I think we're going to get a much greater amount of noise. It's going to have a very broad range of impact that we can only guess, although I think some growing evidence is suggesting that there are real possibilities, that the esthetics and the hunting will be affected. Animals can die off. Animals can leave areas. Animals can become more irritable and vicious due to the noise situation, I suggest. Noise, on the other hand, can be one of the few things that can be more relatively easily controlled than many of the other things that disturb the ecology of animals. We can't change the rain. We can't change too much in the way of odors, and we can't avoid them seeing people, but we can do something about, it seems to me, the noise aspect.

Fortunately, the human being is generally noiseless, but the mechanized artificial devices certainly aren't. Thank you.

Dr. **Meyer**: Thank you, sir. Any comment, Dr. Fletcher?

Dr. **Fletcher**: Yes, I think I have two or three. The evidence we've been able to find about animals and noise shows that there is a decided startling effect consistent with what you said, but that with continued exposure, at lease some of them seem to adapt to this; that there is a difference between an extremely periodic type of noise exposure and one which tends to be continued with some kind of periodicity or fairly continuous. So there are different reactions to those two situations.

Another thing which you didn't mention but I suspect you probably might have wanted to is that the audible range of animals varies widely from species to species. You and I most generally consider the possible effects based on our knowledge of our own audible range and our knowledge of the sound output of the various types of stimuli that we've considered, transportation noise, et cetera. I think until we have a reasonably accurate catalog of the audible frequencies of most species, which we do not have at present, and until we do a little bit better measurement of the sound output of some of the possible sources intruding into this habitat, we might very well not be able to make really good valid scientific judgments of the possible impact of this noise on that system.

Mr. **MICHENER**: Do all the animal species have similar adaptive characteristics?

Dr. **FLETCHER**: I can't speak for all of them, but the data which I have accumulated so far suggests rather strongly that most animals adapt very well. I have pictures, for example, of deer standing 50 feet from the runway of the Fort Walters Heliport where 465 helicopters take off and land periodically during the day. The deer are grazing with helicopters overhead; these are wild deer and obviously grazing. They weren't startled or disturbed by this sound. They were peacefully grazing.

I know of airports within the military where one of the problems is getting the deer off the runway of the airport, and this is a noisy place. These animals at least have adapted to that noise and can live with it. Now, certain other animals might very well have been driven from this area, and there will be different animals fill the void left by the departure of the given species. We don't know all of this.

We do know of some candidates where the situation entails fairly continuous exposure to certain noises, and these are only isolated species, and again we must consider the audible characteristics of the species and the acoustic characteristics of the stimulus.

Dr. **MEYER**: Thank you, Dr. Fletcher. Clyde, do you have a comment?

Dr. **BERRY**: No.

Dr. **MEYER**: On the right? Yes, sir?

Mr. **NORTON**: Mr. Michener, I gather from your opening comments that you have spent a great deal of time in the back country, perhaps visited wilderness areas or back country of national parks where recreational vehicle use is excluded, and I wonder if you have any comments as to your experiences with other kinds of noise intrusion, particularly that of aircraft, say.

Mr. **MICHENER**: Aircraft are fairly frequent up in the northern Rocky Mountain National Park area, I know, and I haven't particularly noticed any real impact upon the local animals. Possibly they have adapted, like he has suggested. I've never seen any panic with high-flying airplanes. I'm sure with low-flying airplanes this would be another problem, as I'm sure almost any kind of sudden startling noise would be, but most of the airplanes, I think, fly relatively high over the mountain areas, and this prevents a serious problem in that regard as far as I can observe so far.

Mr. **NORTON**: How about the impact, personal impact? How do you feel about the noise and the intrusion of aircraft over, say, wilderness areas? My reason for bringing this up is sometimes we tend to overlook it. I wonder if you have any comments or recommendations concerning the intrusion of aircraft noise on these areas.

Mr. **MICHENER**: I guess one time I was back packing for two weeks down in the San Juan area, but every morning there was a 9:00 o'clock plane that came over, and it was my only contact with humanity. In a sense, it was kind of a positive thing to me at that time. I guess it was a Frontier plane going south from Montrose to New Mexico, but it didn't intrude upon my own feelings at that time. It was rather high and didn't seem to discourage anything. Reminded me that there was still another world and I shouldn't get lost in thinking that everything was paradise at this point.

Dr. **MEYER**: That's an interesting observation.

Any other comments, panel?

(No response.)

Dr. **MEYER**: If not, sir, thank you very much.

At this point, it being 12:30, I shall recess to reconvene promptly at 1:30. Thank you very much for your attendance this morning.

(Whereupon, at 12:30 o'clock p.m., the hearing was recessed to reconvene at 1:30 o'clock p.m. the same day.)

AFTERNOON SESSION

Dr. **MEYER**: I hereby convene the second sitting of the EPA's public hearing on noise and would like to invite Mr. Jim Monaghan of the Environmental Corps of the Colorado State University to come forward. Mr. Monaghan?

STATEMENT OF JIM MONAGHAN, ENVIRONMENTAL CORPS OF THE COLORADO STATE UNIVERSITY

Mr. **MONAGHAN**: Thank you. I'd like to thank you for the opportunity of being able to express my views. My name is Jim Monaghan. I'm a graduate student of political science at Colorado State University. My undergraduate background was in psychology and the biological sciences. I'm serving as spokesman here for the Environmental Corps, which is a faculty-student organization and in no way represent the University.

Dr. **MEYER**: I understand.

Mr. **MONAGHAN**: I choose to address the problem of recreational noise for a number of reasons. Colorado is very much a recreational state, and presently our recreational resources are being severely stressed by the thousands of persons who daily seek outdoor recreation. Concerning the proliferation of noise in our environment, recreational noise must be considered herein apart from other types of noise pollution. If one accepts employment, for example, in a very loud environment, he does so weighing the occupational hazards involved. But a family enjoying a picnic near a lake, having to put up with the roar of outboard motors, can only be regarded as having their personal rights infringed upon. And this is a conservative estimate of an individual's rights.

There are many within our group who feel that it is their right to enjoy nature, void of man and machine, for extended periods of time. The pervasive existence of snowmobiles, motor powered boats, all terrain vehicles and the like, must be judged as recreational entities within the context and purpose of recreation.

Webster aptly defines recreation as an activity for the refreshment of the body and the mind. I would venture to say, as a non-expert, that the psychological and physiological consequences of high decibel output from some of the aforementioned recreational sources is the antithesis of bodily and mental refreshment.

Indeed, the various concepts of recreation seem to be on a collision course. Psychologists tell us of the mounting need for escape from the urban environment periodically as a survival mechanism. This parallels the mounting production of machines which are well able to bring the caustic audible urban environment to virtually every recreational area in the country.

Aside from the human aspects of this problem of recreational noise, a most important consideration is the total ecology. Looking at how an all terrain vehicle fits into the ecological scheme, we must bear in mind that some animals and plants are up to 30,000 times more sensitive to noise as are humans.

Having set forth the concept that we feel recreational noise is an important and pressing environmental problem in this region, a logical question arises. Why have Federal regulations rather than state or local control? It is obvious to us that noise is a national problem, but further, recreational noise, produced by vehicles that are manufactured and distributed nationally, would be more easily regulated with uniform requirements that manufacturers would have to meet on a national basis.

We also feel that regulation of recreational noise is in the national interest, whereas on a local level the health and individual rights of those seeking an outdoor experience could easily be subjugated by local interests focused narrowly on the monetary gains of these loud vehicles.

Bearing these arguments in mind, we would urge the Environmental Protection Agency to promulgate regulations for recreational noise within a comprehensive noise control program and include (1) The establishment of uniform decibel limits on all recreational vehicles, whether manufactured in the United States or imported; (2) A provision for research of the state of the art in noise abatement or recreational noise; (3) A provision for testing of all new models of recreational vehicles, and the periodic testing of such vehicles which are already in use; (4) The concept of differential use, and noise zoning, and I'd like to briefly state to the first and the last of these four items.

Concerning the setting of decibel limits, these must be realistic within existing technology. But we urge you to bear in mind that the freedom of an individual to enjoy a recreational experience, unhampered by an obnoxious environment, is of keynote important. We refer, for example, to a report of the Subcommittee on Leisure of the National Industrial Pollution Control Council of May, 1971, which was referred to in earlier testimony today. We'll perhaps take a bit different stand on this.

The report called for a four step, twelve year reduction in noise levels from recreational vehicles. Taking just one example, they call for the reduction of noise from all terrain vehicles, from a 1970 level of 85 dB(A) measured 50 feet from the source, to 70 dB(A), 50 feet from the source in 1983. The 70 dB(A) figure is interesting when considering the freedom of individuals to picnic, for example. Using a table published by Elizabeth Cuadra, 1970, we note that given a 70 dB(A) level, individuals would have to sit closer than two feet apart to permit conversation at normal noise levels. So at face value, being a non-expert, of course, by extrapolation we feel that perhaps these are not the most sensible limits.

Given these problems, we embrace the concept of differential use and noise zoning. In this manner, certain lakes, for example, would be zoned to prohibit motor powered vehicles, while other lakes would be zoned for such vehicles, setting in such a case realistic decibel limits. This concept could be easily misapplied, and we could find all lakes in a certain area zoned for motor boats. But in all of these cases, one must have some confidence in the controlling agency, and further we feel that we cannot rely solely on the technological reduction of recreational noise.

In conclusion I think it fair to mention an alternative to control which is popular in some sectors. And that is, we do nothing, predicated on the fact that man can adapt to the worst of environments. The adaptability of the Homo Sapien was thought by Aldo Leopold to be the real tragedy of humans. In terms of recreational noise, if man, in his escape from urban pressure, must adapt to pervasive noise, it will be the ruin of his physiological and psychological well-being.

Dr. **MEYER**: Thank you very much, sir, for casting this problem into an even more usable context.

Let me ask you one question before asking the panel if they have any questions. How do you equate the fact that some people like noise with the premise that recreation as you have defined it according to Webster, being an activity for refreshment of body and mind? Is it possible that the people who enjoy making noise are doing so because they see it as a recreational outlet, too?

Mr. **MONAGHAN**: No, I am sure they are and I realize this. I think that in any type of decision like this, you have to take those kinds of things into consideration. I think there are limits, and perhaps if a recreational experience is, one, painful and obnoxious and frustrating to a good number of people, then I think you have to perhaps arbitrarily at some point say this is an infringement upon their personal rights.

Now, I think that you also would have to bring in the consensus of a majority or, hopefully, near a majority of people who would, in my interpretation, like a pleasing experience, and this would not—it might be perhaps riding a vehicle like this, but then again if they're 50 feet away eating lunch and talking amongst themselves, then somebody else's pleasurable experience is certainly not their own.

Dr. **MEYER**: Panel on my right?

Mr. **NORTON**: Mr. Monaghan, based on your personal experience with outdoor recreation, would you say, in your opinion, that a large part of our society, perhaps a very large land area of our society, is already given over to the machine and a noisy sort of environment? Do you feel that a quiet experience, the wilderness experience, is something that's relatively rare in society?

Mr. MONAGHAN: Well, yes, I definitely do, and this is one of the reasons, as a matter of fact, we call for differential use. If you cut limits and limit where vehicles can go and this type of thing, you're never going to repair some of the damage that's already been done. Therefore we do recognize that this to some people is educational and perhaps certainly a recreational experience. So we would like to set those areas that are already perhaps desecrated away.

Yes, these areas are slipping very, very quickly, and also it's interesting here, and it was mentioned earlier, that in a wilderness area you're not allowed to have these types of vehicles, but then the buffer areas near those wilderness zones become of critical value, in my opinion.

Dr. MEYER: Anything else on the right?

(No response.)

Dr. MEYER: Left?

Dr. BERRY: I'd like to ask you, since you're not a psychologist and neither am I, if you think that there may be an inclination on the part of the owners of noisy recreational vehicles to either (1) seek attention or (2) deliberately try to annoy someone, the picnickers, for example, or the motorcycle addict who wants to annoy the driver who's crowding him next to the curb.

Mr. MONAGHAN: Well, these perhaps very subtle and deep psychological aspects have been spoken about in the literature before. On a number of studies that I've done, I've referenced those. I think by and large the thrill of this type of recreation is perhaps more traditional, and it springs from some type of psychological need. Tracing it back, you can get as Freudian as you want and go back as far as you want. In most cases I don't think this is obvious. I think it's more traditional than it is psychological.

Dr. MEYER: Thank you very much. I was most pleased to note that you consider the establishment of uniform levels a good idea and to see that you do recognize that local areas ought to be able to control the problem within their own limits.

At this point then I should like to ask Nora Ferry to come forward. Miss or Mrs.?

Mrs. FERRY: Mrs.

Dr. MEYER: Mrs. Nora Ferry. Thank you, ma'am.

STATEMENT OF NORA FERRY

Mrs. FERRY: I am Nora Ferry, and I live in Evergreen in the winter months and in Grand Lake—I mean, Evergreen in the winter months and Grand Lake in the summer months, so I'm quite familiar with the snowmobile situation.

I believe we've done quite a good thing in Colorado with getting Senate Bill 64 passed, which our Senator Joe Schieffelin did a lot of work on, and I was very pleased with the way the snowmobile clubs cooperated.

I feel the greatest noise pollution with the snowmobiles is that they are allowed to roar around residential areas, and I do mean roar around. We have a place, as I say, at Grand Lake, and we've gone up there many times in the winter. We have ceased to go up in the winter because we used to enjoy snowshoeing into our place and enjoy seeing the elk and hearing them bugle, and maybe the only other sound was the cracking of the ice as it freezes, and it's just absolutely out of this world. It's something you just can't describe to people that haven't experienced it.

We now go up, and, admittedly, it's brought great prosperity to the town of Grand Lake in the winter, but we have these snowmobiles roaring around from any time as soon as it's light, and they keep going until sometimes midnight or 1:00 o'clock, so you can imagine how lovely and peaceful it is.

I could say this. Many of my friends that have cabins in various places feel this way, and I think that sometimes they deliberately do it as though to say, well, you shouldn't even own property, you know. That's just tough and so forth.

We have not seen any elk tracks around our place since the snowmobiles have become such a popular sport. The same in Evergreen. Fortunately, we're the banana belt up there, and we don't get much snowfall for snowmobiling, but, however, after a night's snowfall, they will get out on the meadow across from us and Bergen Peak and go in on private land that they have no permission to, roar around in there. We hear them at 6:00 o'clock in the morning, and it goes on.

We have had very good cooperation from the law enforcement agencies up in there, but we don't see our herd of about 26 elk that we have frequently seen, and then as soon as the snowmobiles stop their roaring around, then the trail bikes take over, and I think this is becoming a great problem, and I would like to see snowmobiles banned from all residential areas except in the cases of ranches or where access is needed into a certain place, and I think that certain trails should be set aside and marked, and then they could be moved from time to time for the area to recover possibly.

We have had very good enforcement, I hear, of the forest people getting them to keep off the tundra. I think it is getting better. I also feel that manufacturers should be required to meet a certain decibel level. We had a friend up in Grand Lake that last New Year's Day lost the hearing in one ear. He was one of the snowmobile nuts, and you can't get him to go on one now, and he should have had—I think also another requirement would be for riders to be required to wear some kind of ear protection. Our neighbors do. They wear ear protection, and they are very, you know, careful of where they ride their snowmobiles. There are just a few nuts that spoil it for everybody.

I think it's a tremendous sport, and I think the snowmobile clubs should be congratulated. I think they've done a great job. I feel that we should have local control. I'm very much opposed to Federal control. I would like to see the local people take it into their hands. I'm very, very much against anything more about that, and I wanted to just congratulate President Nixon on his latest statements on the environment. I think we have to reach a balance, and we've got to think of jobs and economy, too, and not go hog wild off on some ecological thing.

Thank you very much.

Dr. Meyer: Thank you, ma'am. Would you wait just a minute in case any of the panel have a question? Left?

(No response.)

Dr. Meyer: Right?

(No response.)

Dr. Meyer: Thank you, ma'am. I would point out one thing; that is, our proposed Federal legislation, as seen both by the executive branch and within the Congress, envisions Federal standards for vehicles, but reserves to the states and the political subdivisions down to the city or township the control of the actual use, which I think would fit in with what you're saying.

Mrs. Ferry: That would fit. Very obviously for controlling the vehicles, we would have to have national control. Thank you.

Dr. Meyer: Thank you very much.

At this point then I should like to ask Mr. Ed Simpson of the Department of Environmental Health and Safety of the University of Nebraska to come forward. Nice to have you here, sir.

STATEMENT OF ED SIMPSON

Mr. Simpson: Thank you. I'm Ed Simpson.

Dr. Meyer: Nice to see you can come over here for other than football games.

Mr. Simpson: I believe you all have a copy of the reprint that I have passed out.

Dr. Meyer: The reprint the witness has mentioned for the record is "Tractors Produce Ear Damaging Noise," a study made by the University's Division of Environmental Health and Safety, which shall be included in the record following your remarks, sir.

Mr. Simpson: I'll just make some remarks regarding this and another statement or two.

Dr. Meyer: Yes, sir.

Mr. Simpson: This study was made by the University's Division of Environmental Health and Safety under contract with the Division of Occupational Health of the Public Health Service. Fifty-five tractors and 18 other pieces of farm equipment were tested at Nebraska's Tractor Testing Track, where new tractors are examined annually for horsepower, fuel consumption and other items of performance.

We had an ideal situation in '65. This is the most tractors that have ever been tested in any one year, and we had an ideal chance to study many tractors.

From this study we not only took the farmer in a sitting position, but we took him in a standing position because we understand a farmer stands half the time on his tractor, and when he stands, the exhaust is a little bit more in line with his ear standing instead of sitting. We also took the studies at a hundred percent load on the tractor, 75 percent load and 50 percent load: and at a hundred percent load—this is on the dB(C) scale now. This was recommended by the Public Health Service. When we run this on the dB(C) scale, sitting the lowest we had was 97 dB(C) and the highest, 113 dB(C); and standing was 97.5 dB(C), and the highest was 114 dB(C). So you see this is quite a concern for the farmer.

We're very much concerned about the farmer, although he might not be concerned about himself, because we think he needs to be educated, and the more education we can give him in many ways, which will be mentioned later by one of my colleagues, of how we're trying to reach the farmer and how we're trying to teach him to wear ear protection, or if his muffler comes off, that he replace it and not throw it away. The farmer doesn't only throw his muffler away, but he puts a radio on his tractor. Then he runs the radio over the tractor noise to hear it. So this makes it a little bit more of a problem.

Some of the other incidents in the farm that we tested at the time was corn pickers, elevators, driers, mixed, reciprocal blade power saws, hammer mills, beet pullers, roller mills, blowers and others. So we got more than just the tractor on the test track.

Did you get the little booklet?

Dr. **MEYER**: Yes, sir.

Mr. **SIMPSON**: Starting in 1970 the Tractor Testing Division of the Department of Agriculture, Agriculture Engineering started making noise levels on all tractors now coming through the University and will continue to do so, and I think that industry is doing a good job in trying to reduce this tractor noise. They've produced cabs now that have reduced the noise down practically some under the 90 dB(A) levels, and I think they should be commended, and they're working hard towards this.

The '70 is the only one listed in here. The '71's aren't published in the book yet, but I thought you'd like to have this.

Dr. **MEYER**: That will be appropriately referred to in the record, sir. The document for the record is entitled "Nebraska Tractor Test Data, 1971," a publication of the University of Nebraska's Department of Agricultural Engineering, Lincoln, Nebraska.

Mr. **SIMPSON**: We also have quite a bit of farm acreage. We have nine large experimental acres. We have lots of farm equipment. We provide these people with ear protection, either plugs or muffs, and we have a hard time educating our own people to wear them. We have them that wear them all the time, part of the time and not at all, and I think some of the evidence that's also in this reprint here shows the audiograms on the back where this shows they're not getting the protection. So we still have to do a big job of education.

Do you have any questions?

Dr. **MEYER**: Yes, indeed, I'm sure they may be one or two. Dr. Berry?

Dr. **BERRY**: No.

Dr. **MEYER**: On the right?

Mr. **STRUNK**: Yes. I wanted to inquire as to why you use the C scale for a unit of measurement rather than the A scale.

Mr. **SIMPSON**: Well, this was recommended by the Public Health Service when we first set this up in '65. It wasn't our choice.

Mr. **STRUNK**: I see.

Mr. **SIMPSON**: If it was done today, we would use the A scale.

Mr. **STRUNK**: The point is sometimes this can be confusing for people to read and evaluate.

Mr. **SIMPSON**: The lower frequencies show a little higher in the C scale. We realize this.

Dr. **MEYER**: Well, I think that highlights an important point; it was brought out over in San Francisco that we've got to have some agreement concerning the significance of all the various methods of measurement. There is a great tendency for using the dB(A) scale, but there's still some people who say that as you get in more intense sound pressure levels, that maybe we ought to go back to the C scale. That's still a moot point.

Thank you very much, sir.

Mr. **SIMPSON**: You're welcome. Thank you.

Dr. **MEYER**: I should now like to ask Mr. Donald Ahrenholtz of the Colorado Farm Bureau of Denver if he would come forward. Did I pronounce it right, Mr. Ahrenholtz?

Mr. **AHRENHOLTZ**: Yes, sir.

Dr. **MEYER**: Thank you.

STATEMENT OF DONALD AHRENHOLTZ, COLORADO FARM BUREAU OF DENVER

Mr. **AHRENHOLTZ**: Thank you. Mr. Chairman, members of the panel.

I'm here to speak on the environmental noise caused by farm equipment.

Colorado Farm Bureau is an organization speaking for over 13,000 voluntary farmer-rancher members who operate farms and ranches across the state. Our offices are here in Denver at 2211 West 27th Avenue. Our mailing address is Post Office Box 5647, Denver, Colorado 80217.

Farm tractors and other self-propelled farm equipment are not sources of noise pollution. And if in the wildest sense of the imagination, farm equipment noise is considered pollution, then only the polluters are polluted.

Farmers have been required, because of the cost of their operation, to increase their efficiency. Thereby farm operations have been required to go to mechanization, and so farm tractors and other self-propelled equipment are required to operate at full loads and are conducted in the field away from everyone but the farmer operating the equipment himself. The average farm or ranch size in Colorado is 1,300 acres; we think this is more than an adequate noise barrier.

EPA rules and regulations would only protect the farmer or rancher operating said vehicles. There are fewer than 30,000 farmers and ranchers in Colorado. And any such EPA rules and regulations could only require noise suppresent equipment now available on the open market. 'Course, any equipment required for a farmer to add to his equipment would increase his cost of operations, and at this time farmers and ranchers throughout the United States, not only in Colorado, have found it difficult to increase—to pass on any increase in operation to the ultimate consumer or anywhere along the line, and so they've had to bear this cost. I think you can see by the net income of farmers and ranches throughout the United States that it has been the lowest in many years. So such rules would force a farmer to protect himself from himself. Is it possible?

Some hearing health problems may be involved, but this hearing is being held to discuss the environmental effects of noise caused by farm equipment.

We submit farm equipment is not a source of noise pollution. Colorado's noise abatement law, considered by many to be forward looking, considers noise from agricultural operations to be insignificant.

Please make our statement a part of the hearing record, and thank you for allowing us to appear before you.

Dr. **MEYER**: I'm glad to get this viewpoint, sir, because it certainly will help us when we get around to actually setting some national standards if we take into account those things that may require certain exemptions or exceptions.

I would like to ask a couple of questions before I ask the panel if they have any questions. You mentioned the average ranch size being around 1,300 acres. On such an average—and I realize that it's bad to start talking averages because of the variation—what would you estimate to be the average number of off-road farm machinery owned on a typical farm?

Mr. **AHRENHOLTZ**: Number of—

Dr. **MEYER**:—Tractors and other sort of heavy power devices, crushers, feed mills.

Mr. **AHRENHOLTZ**: Oh, I don't know. It's only strictly a guess. I would say from 10 to 20. It depends on the size of the operation, and this, of course, is an average size, and this decreases in a ranching operation. A ranching operation probably wouldn't include this many pieces of equipment as a farming operation along the Platte Valley or Arkansas Valley.

Dr. **MEYER**: So all the users then would not necessarily be the farm family; there would be some employees?

Mr. **AHRENHOLTZ**: Some employees, true, sir.

Dr. **MEYER**: Although this is an environmental hearing, the Congress, when they authorized us to make this study, asked us to study noise per se as a total problem. So, of course, while the responsibility for occupational noise rests with the Department of Health, Education and Welfare and the Department of Labor, we have been getting some information along these lines that they may use also. So I can't completely agree that it's only restricted to the farm and, therefore, we shouldn't be concerned about it. The fact still remains, as the construction industry pointed out, that maybe what will have to be done for equipment that's exclusively located on a special site is to treat it somewhat differently than equipment which is going to be moved all over. Along those lines it would be a safe assumption that in the main, a piece of farm equipment bought by a rancher stays on that ranch and is not put in the used market?

Mr. **AHRENHOLTZ**: It stays on the ranch, and they do trade them off later on. Many of them do. Many of them keep it. We commend the University of Nebraska for what efforts they are making to alert farmers to the noise and to protect themselves by wearing earplugs or whatever it may be. I think the equipment companies have made great efforts in reducing the noise decibels on farm equipment.

Dr. **MEYER**: Thanks. Are there any comments on the right?

Mr. **NORTON**: Just a brief question concerning the employees of farms and ranches who might be subjected to noise levels. Do you feel that a regulation might be in order to protect farm workers and these people? I agree with what you say concerning the owner of the equipment himself having at his discretion the use of that equipment and choosing to do so knowing what the effect will be to himself, but what about to employees? Do you feel that something should be done to make these people aware or to—

Mr. **AHRENHOLTZ**:—I think the educational approach as taken by the University of Nebraska is an excellent approach, and I think when you suppress the equipment by adding mufflers or whatever you do, you also create another problem, because if the engine isn't operating efficiently, then do you also in return cause air pollution, more pollutants in the air, from a decreased efficiency in the engine.

Dr. **MEYER**: Anything else on the left? Clyde?

Dr. **BERRY**: This morning we learned that at least an owner of a snowmobile preferred a quieter vehicle. I would ask you, do you think that the farmers would like to have quieter equipment if it were available at no extra cost?

Mr. **AHRENHOLTZ**: I'm glad you added that, Dr. Berry. I'm sure they wouldn't object to quieter operating equipment. I'm sure that they're not looking for a piece of equipment that makes a lot of noise. We would hope that this would be possible at no extra cost, sure.

Dr. **BERRY**: My second question—

Dr. **MEYER**:—Would the panelists yield? Maybe you were going to ask the same question. I'm jumping in. What would you consider to be a reasonable percentage of increase in the cost of a new tractor to have a quieter one?

Mr. **AHRENHOLTZ**: This again depends on whether you're putting on a muffler which may reduce the horsepower or whether you're required to put on a thousand or up to a $1,500.00 cab on the tractor to keep the noise from reaching him.

Dr. **MEYER**: Well, I guess the question I'm asking is what's a ball park sort of figure? These things escalate anyway because of production costs. The manufacturer has to pay higher labor, and so forth. So your cost is going up all the time, anyway.

Does a five to ten percent increase seem unreasonable to provide for hearing protection instead of having the operator wear earplugs?

Mr. **AHRENHOLTZ**: I'm sure it would be until the farmers and ranchers can organize to some way not be at the bottom end of the totem pole in prices.

Dr. **MEYER**: I understand what you're saying, sir, perfectly.

Any other questions, Clyde? Go ahead, sir.

Dr. **BERRY**: You gave a figure for the membership of the Farm Bureua of Colorado.

Mr. **AHRENHOLTZ**: Yes, sir.

Dr. **BERRY**: Could you break that down as to those people among your membership in the figure that you quoted who are actually farmers and those who might be such as I? I live in town. I belong to the Farm Bureau. My cars are insured with the Farm Bureau, praise God.

Mr. **AHRENHOLTZ**: I'm glad to have you, sir.

Dr. **BERRY**: I thought you might like that. What percentage of your membership—

Mr. **AHRENHOLTZ**:—I'd say we were close to 80 percent of that figure as farm operators and farm employees.

Dr. **MEYER**: Any other questions? Yes, sir?

Dr. **FLETCHER**: I think there's one problem maybe in that Colorado farm operations differ from other places I've been, but I've seen some farm equipment—either the farmer has field he leases or owns away from his home operation, or else he's sharing a piece of equipment with another farmer down the road. Frequently this goes out on the road as well as staying on the farm. I think with regard to gasoline tax, as I recall, they've got, they color the gasoline, so you better not be turning up out on the roadway with purely farm gas. But wouldn't we have a problem then if we allege that this operates only on the farm and isolated by so many acres of distance, and then of the farmer who has to take a piece of equipment and take it out on the road and go under its own power to some other place, and wouldn't there be the problem then of duel operation out on the road as well as on the farm?

Mr. **AHRENHOLTZ**: Well, this—of course, many farmers have been forced to increase the number of acres they operate, but if it gets to be too far away from their main farmstead, I'm sure many of them transport it by trailer or a truck to that next operation. They're not going to drive a tractor five or ten miles because their time is too valuable. They will transport it some way.

Sure, a lot of them travel maybe a half mile or a mile or two from one field to another, but usually in those areas also there may be one person living there or nobody living in between, where in the Midwest there may be two or three families living in that same area.

Dr. **MEYER**: There's one other aspect to this before we move on to the next witness. I'm sure that your attention was focused primarily on the tractor and heavy equipment, but there's some gasoline powered equipment which is used both in farming and recreational use—namely a bigger power saw, certain power saws or motor generators. I'm not opposing the use of portable power sources to make man's toil easier, but I think you would concede, or at least I would hope that you would concede, regulation of noise sources from these devices is important if we are going to take care of noise in recreational areas as well as farm areas. I'm sure you see what I'm talking about.

Mr. **AHRENHOLTZ**: Yes, there are similar types of engines on augers.

Dr. **MEYER**: Power saw, auger, motor generator. Seems to be extremely difficult to exempt that purely for farm use, because I have no assurance that a power saw is not going to be put in the back of a pickup truck and hauled up into the national forest or some nearby forest and used for recreational purposes.

Mr. **AHRENHOLTZ**: True.

Dr. **MEYER**: Thank you. No further questions?

(No response.)

Dr. **MEYER**: I appreciate your statements.

Mr. **AHRENHOLTZ**: Thank you, sir.

Dr. **MEYER**: At this point then I would like to ask Mr. Howard McGregor of Engineering Dynamics, to come up. Mr. McGregor?

STATEMENT OF HOWARD McGREGOR, ENGINEERING DYNAMICS

Mr. **McGREGOR**: Thank you very much. I was contacted by the group just a day ago, and they asked me to prepare a written statement and I didn't have time to do it.

Dr. **MEYER**: That's all right sir.

Mr. **McGREGOR**: I'd like to just give a little background of my experience here in the Denver area. Starting about 1962 I started business on a part-time basis as an acoustic consultant in the Denver area. Since that time we've worked on several jobs, most of them involving noise and buildings and residential areas.

With respect to noise pollution, I think probably the most interesting job or controversial one that I worked on was an amusement park here in Denver. The amusement park people put up a new roller coaster, and this roller coaster was adjacent to a street, across from a street, where people's homes were. The sound levels produced by this roller coaster as it came down the hill was in excess of 85 dB(A). This was in the people's homes and their front porches.

I was retained by the people in the community as their acoustic expert in a lawsuit that was against the amusement park. The amusement park put up some noise prevention techniques, noise control systems, large plywood panels to block off the noise from the roller coaster, and in some cases in some areas of the neighborhood, this worked very good. It was my opinion that in certain areas at one point in the street the noise was not really abated to a level as it was before the installation of the roller coaster. That's about the only interesting job of this type that I've worked on with respect to noise pollution into a large area of a community.

I would pass on a few comments on the Colorado State Law. I read it over, and I didn't see anything in that law about boats, motor boats and speed boats. We have a lot of small lakes here surrounded by communities. We have speed boats out in these lakes that have a hundred horsepower. They make a considerable amount of noise, and I guess we could construe that as a definite noise pollution. I think something should be done about that to get the state law corrected to include motor boats.

It's also my opinion that the sound levels, the maximum sound levels, listed in the state law are on the high side and that they should be lowered perhaps three to six dB.

That's about all I have to say, if you want to ask any questions.

Dr. **MEYER**: Yes. I find your experience interesting. When we talk about recreation, everybody immediately thinks of getting up on a ski lift and going up to the top of the hill and skiing down or walking in the woods. There are people in rural communities who do attend carnivals. I think that your statement here finds me intrigued. If it was 85 dB(A) at the home across the street, it must have been using the inverse square law coming back. It must have been rather loud to the people walking around in the carnival and also riding the ride. So that would lead to a question. Did you make, by any chance, any measurements?

Mr. McGregor: No, we didn't take any measurements in the amusement establishment itself because we were on the plaintiffs' side of the case, and we really weren't worried about those levels inside the park. We were worried about the people in the neighborhood outside of the park.

Dr. Meyer: The Federal Government's not going to get itself involved in the business of making legislation in this particular area. However, one of the charges we have is the establishment of model codes and model laws, and I'll have to confess this sort of thing has sort of escaped our attention. We have to take a look at what are the reasonable limits, taking into account that noise in this environment is sort of associated with the traditional elements of activity.

Mr. McGregor: Yes, that's true. It might be worthwhile to know the kind of noise exposure the employees get.

There's one other area there's a lot of complaint about. I have no analytical measurements to talk about it with respect to sound pressure level, and that's, of course, the automobile speedways around here. The noise from those establishments can be heard all over the city on Saturday or Sunday night, whenever they're racing, and I think you could say beyond a shadow of a doubt that the people that drive these cars without ear protectors have suffered a hearing loss. There's no question about that.

Dr. Meyer: Fine. Thank you very much. Panel on the left? Dr. Berry?

Dr. Berry: No.

Dr. Meyer: Right?

(No response.)

Dr. Meyer: Well, thank you so much, sir.

Mr. McGregor: Thank you very much.

Dr. Meyer: At this point then I should like ask Mr. Nicholas Pohlit, Executive Director of the National Environmental Health Association, to come forward. Nick, nice to see you. I've known Mr. Pohlit for a number of years. Look forward to hearing your statements.

STATEMENT OF NICHOLAS POHLIT, NATIONAL ENVIRONMENTAL HEALTH ASSOC.

Mr. Pohlit: Thank you, Dr. Meyer. Dr. Berry, members of the panel.

First of all, I'd just like to mention that our organization is located here in Denver, Colorado at 1600 Pennsylvania. We're approximately 35 years in age, if that means anything. We try to do something also. We're a national nonprofit organization of professional men and women engaged in environmental control with a goal of improved national health.

I'd like to read this statement because I think it does have some impact and should be of some interest to your group.

Noise is being recognized by increasingly diverse groups of people as a health hazard. Machines that have until recently been considered only as a means of accomplishing more with less effort are now recognized as a contributor to such ills as hearing loss, nervous disorders, speech interference, impairment of dexterity and other stresses. As the number of machines grows, stresses increase, and it is plain to see that "something's gotta give."

Jet aircraft, interstate highways and expressways are creating new problems. Farm machinery and recreation vehicles of all types are taking motorized noise to rural areas. Power equipment for home and landscape maintenance are adding to the noise build-up. In the home, there are increased noises from automatic electric appliances, radio, television, stereos, dishwashers, air conditioners, waste disposers and a multitude of other gadgets. Combined with lightweight building construction and inadequate insulation, noise pollution results.

Noise is an environmental problem that can be controlled by adequate noise control legislation, competent enforcement officials, technical knowledge, and dissemination of information. Useful noise control programs call for adequate funding from all levels of Government.

We believe that long range solution for noise reduction depends in large measure on consumer demands for quieter equipment. These demands will have to come from housewives, the man on the street, plant managers, industrial workers, airport operators, and airline companies, among others. The problem of noise must be recognized and accepted as a decisive factor in community, industrial, and urban planning. Engineering specifications will have to include maximum allowable acoustical noise levels for equipment, or the more costly "after the fact" noise control through the courts will be necessary.

In many parts of the United States, local Governments are concerned at the growing level of noise pollution within their environment, and many cities have enacted noise legislation in one form or another. Much of the existing legislation, however, is aimed only at road traffic—that of requiring mufflers. This legislation serves a purpose but is grossly inadequate to deal with the multitude of disturbing noises that are created by aircraft, road traffic, industrial and farm machinery, lawn mowers, to mention only a few.

The greatest difficulty is met in wording legislation; therefore, the starting point must be to draft legislation to control and effect protection of public health. City ordinances can provide some measure of noise control, and such ordinances should be adopted for control of such noise nuisances as barking dogs, transistor radios, loud speakers, model aircraft, squealing automobile tires, street musicians, ice cream vendors, jack hammers, mobile compressors . . . et cetera.

This type of legislation is purely punitive, however, and has the restriction built into it that no action can be taken until the nuisance is being created. This is one essential method of control, though—setting fines for violating set standards. It deals mainly with limited sources of noise and relies on local responsibility for enforcement. The basic drawback is that it does not attempt to prevent noise but merely punishes where and when it is discovered. Prevention would undoubtedly be the best method of controlling noise, and usually would be the cheapest.

Special zones for industrial use with less severe restrictions are becoming more common in other countries as city planning becomes more universal, and even tighter controls can be observed in reports on zoning from several countries. In the United States, provisions in the Walsh-Healey requirements not only restrict permitted noise levels to which industrial workers may be subjected, but may possibly be used to restrict the use of noisy equipment.

Preventive legislation should be the result of close cooperation between the legal draftsman, the city and county planning officer, the environmental health officer, and an acoustical consultant—coordinating matters of city community development, planning new schools, freeways, industrial and commercial developments, and particularly new housing projects. In England, every new plan proposed by a city or received by the city for approval must be considered in the light of noise pollution in the same way they are considered for structural or architectural design.

British noise authority, Cyril Duerden, projects that noise pollution prevention in the United States could be the responsibility of a central enforcement and appeal agency within each state, working in conjunction with city Governments to train technical officers in noise control, monitor premises with special noise problems, review plans for repair, alteration or construction of new plants or developments, and ensure periodical inspections by central and local officials. Flexible structure would allow regulations to follow closely upon the heels of technical advances in measurement, assessment and control techniques.

As vehicular noise attracts much of the attention in this area, let's consider that particular noise. Generally speaking, the noise created by an individual vehicle such as a farm tractor or a snowmobile is outside the jurisdiction of local Government. Several countries, however, have adopted maximum noise levels which may be created by various types of vehicles, including private automobiles, trucks, buses, and motorcycles. Some vehicular control can be accomplished by proper planning of freeways, major traffic arteries and traffic control, with special emphasis so that proposed traffic routes do not interfere with the quiet of hospitals and institutions or with teaching in schools.

In one instance, it was found that traffic noise so interfered with teaching that more than 20 percent of the teaching time was being lost because children were unable to hear. This means that the children in that school were receiving only 80 percent education, and that one school day in every week was being wasted.

In England, the Noise Advisory Council is considering proposals for strengthening laws to control noise. And, we might add, England has been working on the noise problem for more than 20 years and has a high degree of control. They propose that city authorities should declare noise control areas in which the existing noise level must not be exceeded and in which, within a reasonable time, the noise climate in these areas must be reduced.

To arrive at a satisfactory solution to the noise problem, education in many forms is needed. Presently there are not enough technically trained people to evaluate the specific problems and determine equitable solutions. Although there is need for legislation, before it can be enacted, legislators must know the problem. If they don't, legislation may be too lenient to provide effective control, or on the other hand, it may be too strict to be enforceable.

Once legislation is enacted, enforcement and abatement must be implemented. This means educating enforcement officials, environmentalists, sanitarians, industrial hygienists, police officers, zoning officials, and whoever is responsible for control. These people must be trained in the use of noise measuring equipment and interpretation of measurements, as well as in psychological, social, and physical problems caused by noise and in planning for noise reduction.

The general public must also be educated. Programs designed to create greater public awareness of noise problems are necessary. Public recognition would stimulate municipal agencies to enforce anti-noise ordinances more effectively, would compel manufacturers to abate noise conditions in their plants and in their products, would alert city planners to take into account potential noise problems when considering zoning for development of new communities.

In order to "get the show on the road," the National Environmental Health Association recommends that the Federal Government EPA, through funding to colleges and universities with environmental health curricula (there are about 40 in the nation), in fact, a little over that now, begin a program to train the necessary personnel for noise control. There is a need for technicians, environmental health administrators, planners, and information people who will be able to use this specialized knowledge for the public good. Let me mention that right now we are in the process of suggesting a curriculum to all of our undergraduate schools throughout the nation that have a curriculum in environmental health. Immediate steps should be taken to include courses on noise in the existing curricula so that say, in two years or less, we could have some trained technicians and persons with baccalaureate degrees who have now already completed their basic courses and their general environmental health courses and who could include these specialized noise classes in their last year or last two years. If such courses could be made immediately available, we believe that students would take advantage of them, and we would have a manpower pool to begin almost immediate implementation of noise control programs.

In order to create this manpower, funding must be forthcoming for colleges and universities and even for technical schools, to set up the programs, to recruit students, and to provide educational assistance funds for the students. Such funds could be provided by training grants and contracts and by scholarships. We surge EPA to move rapidly in the direction of noise control through education.

Also I just wanted to mention that recently there was a study in Cleveland, Ohio pertaining to individual residences, which I think you've already heard the facts on at another hearing; I'm sure it's already a part of the record, so I won't go into that, but lastly, I'd like to just bring out why I stress so much what we're doing.

Over in England, until you go over there and see what's going on do you see how much progress has been made not only in noise, but in all areas of the environment. We have a great lesson to learn. They're very, very skilled. They know what they're talking about.

For example, here are two texts here which I'd like to mention as a part of the record, The Law on Noise by the Noise Abatement Society and especially Cyril Duerden who I mentioned here who was here recently in this country touring the total country of the U. S. plus all parts of the world, and also another one which he authored, Noise Abatement. In fact, we'll probably have him over here within the next year to put on workshops throughout the United States.

Again, on behalf of the National Environmental Health Association, we do want to thank you and your panel for inviting me over.

Dr. **Meyer**: Would you mind waiting to see if the panel has any questions? On my right?

Mr. **Norton**: Mr. Pohlit, one thing that bothers me concerning public education is the way that the public might be educated to perhaps not accept or reject some of the very noisy devices that are on sale in our society, but so far I really see no way for funds to be made available to more or less tell the other side of the story; that is, that recreation vehicles, for example, being very noisy, are an exclusion in certain areas on remaining unspoiled lands.

Do you have any suggestions as to where or how these funds for public education might become available?

Mr. **Pohlit**: Yes, I would say this, that presently there is a tremendous amount of funds available in the Federal Government that are being allocated now to various schools, such as schools of public health, other institutions, and let me say that there are too many deadheads in our institutions, colleges and universities and also in various regulatory agencies, and I don't think we'd have to delete any of them, and we say that they just don't know what the priorities are today pertaining to our environment.

This is specifically right off the top of my head, and I certainly would never apologize for making such a statement, because I could be very, very specific whether we're talking about the State of Colorado, the City and County of Denver, or any one of the local health departments in the State of Colorado, as well as the total country, because I am around the country constantly and have been for the past 15 years.

In fact, the National Environmental Health Association has an evaluation program for doing this type of work; not only noise, but the total environment.

Mr. Norton: So you think then that perhaps there should be more pressure put on the Federal Government to provide these funds for public education?

Mr. Pohlit: Yes, it could be pressure. It could be educating. Many terms could be used here. It's primarily making sure that the leadership at the top knows what they're doing and aren't influenced too much politically by where this money should be going. In fact, we could even go a little bit further and say there are too many organizations who have their hand in the till, and it's really awful to say this type of thing, but it's constant and I see it daily.

Dr. Meyer: Anybody else on the right? Mr. Botsford?

Mr. Botsford: Have you considered the possibility of using short television commercials? I know in the area where I live there are all sorts of public service announcements made free. It's really up to some organization such as yours to sponsor it.

Mr. Pohlit: If I would have had the time here, I would have gone into depth into various ways and means to accomplish this. I think your idea is a very, very good one. It's one of the many, many that could be used.

Let met say also that not too long ago, President Nixon did sign an educational act which provided, I think, approximately four million dollars which they are using, and it should have been about 15 million, but due to the economy, the way it is, that's the way it is done, but they're going ahead with this type of program very, very rapidly and getting into the total schools around the nation. Again, part of their program, I'm sure, will be this, what you have just mentioned here on the film strips and whatnot.

Also let me just point out one other thing to that. We do put out a journal of environmental health which I'm managing editor of and which has world-wide circulation. We've been involved in this noise thing for many, many years, so it's nothing new to us. We're trying to, let's say, sell the country on this type of a program.

Dr. Meyer: On my left, any comments?

Dr. Berry: Nick, I'd like to ask you about your educational regimen which is proposed. This seems to me like it's closing the door after the horse is stolen. If you'll hold the record for just a minute.

(Off the record.)

Dr. Berry: In the control of noise in education, a sizable segment of this might be directed toward those people who design equipment that make the noise. You said nothing about engineers and so forth. Would you care to expand your gratuities?

Mr. Pohlit: I think our relationship with industry is getting better every day and especially the work which EPA is presently doing. I think they're well up on these things. It's just a matter of time that they really do the job that has to be done, and I think the time would have to be given to them anyway no matter what regulations are made up, and so I think this will come about and again through a little bit of knowhow from such people as you right here. This can be done, yes.

Dr. Berry: What I'm trying to do is get on the record a recommendation from you, and perhaps I am putting words in your mouth, that you're recommending that the interdisciplinary approach which is being propounded and proposed and promoted at this particular time might very well be extended as to the engineering colleges in addition to those people in those places where—

Mr. Pohlit:—I should have put it in. I slipped, Dr. Berry.

Dr. Meyer: Let me, before you leave, Mr. Pohlit, make a couple of comments for the record.

You've raised a point which we're raising. This will help answer a question propounded from the floor. A good point was raised by Mr. Pohlit as to the construction of homes and apartments, where paper thin walls do not keep noise confined. Could the FHA be used to improve this? In fact, the Department of Housing and Urban Development has just, with our knowledge, recently put together some new rules and regulations which deal most extensively with the subject of noise control associated with projects financed or supported by mortgage guarantees of the FHA, but its very important for everybody to keep in mind that it isn't just a problem of establishing zoning. As brought out in our hearing in Dallas, there's a great need, talking about buildings and land use, to also recognize we've got to take into account the total land use or people use planning, and the building codes.

I noticed you mentioned in your paper something about designating noise areas in which the noise level ought to be reduced, which is a very good suggestion. There is also a need to take into account if, for instance, you're going to allow airports to be built and have flight patterns, zoning compatability. The building code in that zone should also require the proper construction needed to muffle noise that's to be permitted.

We're dealing with a three dimensional problem. It's not just a two dimensional problem. We have to get all of these things together. Unfortunately, to date that has not been very well done in very many places.

Thank you very much.

Dr. Meyer: I'd now like to ask Mr. John Glen if he's here.

Mr. Glen: Donald.

Dr. Meyer: Donald. I've got it written down here as John. Well, there is a real John Glen. We know he's in Ohio. I apologize for the mistake in the name, sir.

STATEMENT OF DONALD GLEN

Mr. Glen: Thank you. First, I am speaking as a private citizen and not representing any group, and that's the way it started out to be, but when I told some friends that I was coming down here today, they saw my statement that I have put together here and they, four-five people, wholeheartedly endorsed it immediately. So I am really representing some sort of group of neighbors.

Second, I am in favor of stronger noise control laws, and wherever two statutes are in conflict, the strongest one should prevail. My reasons are as follows. For eight years our family lived in the Martin Acres area of Boulder, less than one-half block from the Boulder-Denver Turnpike. Approximately three years ago we decided that the noise level generated by turnpike traffic was becoming unacceptable.

For example, we would be awakened at 6:00 a.m. by traffic heading for Denver from Boulder. Other noise was generated at various times by trucks, sports cars and so on. This, among other reasons, convinced us to move to our present address.

Since we have moved a median barrier for prevention of head-on collisions was installed on the Turnpike, and has a result, we have acoustical reflections coming in, and the noise level, in my opinion, is much higher than it was when we moved. So that sort of situation in the residential housing area is still deteriorating.

We have been at our present home for two and a half years now, since the spring of '69, and at first things were usually quiet. The first summer we could hear and see an occasional motorcycle in an open area about three blocks away. Now, during our third summer it is not unusual to hear eight or even 12 motorcycles and mini-bikes simultaneously. Starting this spring and throughout the summer the noise has been very loud almost every day.

What makes this unacceptable is that many of the motorcycles and mini-bikes do not appear to have mufflers. I have gone to the area on five separate occasions to see what was going on and what could be done, if anything. Reasoning with the cyclists was difficult. Three times I was told where to go because I was told we were on private property and they could do as they pleased. Another time the cyclist said he had just bought his used motorcycle for racing and was trying it out, and he was unaware he was disturbing anybody. He was about the most polite person of the group.

In the meantime the apparent owners put up no trespassing signs which were torn down within a short time, within a few days. The last time I went to this open area was on Labor Day with Mr. Martin, the Boulder noise control officer, and two neighbors who were disturbed by the noise. I had requested Mr. Martin to make noise recordings so that the owner of the property could be forced to control the situation through court action. In the past the owner refused to press charges, and the Boulder noise ordinance does not apply to private property.

On Labor Day—well, the Boulder noise ordinance is effective only on city streets, and I was told this by police officers that would come out and just say that's it. We can get them if they're on the street. We can't get them on private property.

On Labor Day there were four noisy, unlicensed trail bikes and a mini-bike. One of the neighbors recognized a cyclist as a person against whom he had signed a disturbing the peace complaint the previous Thursday for the noise he was making with his motorcycle. So, in other words, this particular motorcyclist had been summoned to court, and since then he has pleaded guilty to the disturbing the peace complaint.

As Mr. Martin was making the noise recordings as prescribed by state law, the cyclists came to see what was going on. Each made a statement to the effect that he did not think he was noisy. One asked a question, which I think I would consider a threat. "Do you want us to ride around here or riot?" A co-worker—I work at the office of Tele-Communications in Boulder as an electronics engineer, and a co-worker there who lives close to what is now Thunderbird Drive in Boulder is planning on moving because of heavy traffic that will be becoming resultant noise from this heavy traffic when an interchange and a new Boulder by-pass are built.

I would like to point out that most people cannot afford to leave an area when it deteriorates for one reason or another or, in this case, noise pollution. Noise pollution, in my opinion, should be controlled to the greatest extent possible to prevent the deterioration of a neighborhood. What I would like to do is read the Sunday morning paper on our back porch, and even this becomes unpleasant at times because the motorcycle noise starts about 9:00 o'clock in the morning out there.

On the noise recordings that I have here that were made by Mr. Martin for the action that we intend to take, Mr. Martin wrote on the EA chart paper that certain sections should be omitted, and this was due to jet aircraft passing over. So we're getting bombarded any which way we turn. I have not run any noise distributions on these charts. I think it would be interesting to see for that particular time of day, which was between 6:30 and approximately 7:30 or 8:00 o'clock at night, just how high the noise levels really were.

In closing I would like to make a plea for stronger noise control legislation, and wherever laws are in conflict, just try to get the stricter law to prevail.

Dr. MEYER: Thank you very much. Any questions on the right? Yes?

Mr. NORTON: Just a comment, Mr. Glen. I can share your concern and frustration over this sort of event because living where I do in Evergreen, we occasionally have problems of this sort in our area, and we do not have, by the way, the kind of model law that you apparently have in Boulder as far as noise abatement is concerned. It is a serious problem. Short of stringing neck-high piano wire, I'm not sure really what can be done about it.

There seems to be a lack of recognition on the part of many people who use these devices that they extend their radius of influence, detrimental influence, greatly over large areas with this noise. I'd like to thank you for your comments.

Mr. GLEN: Well, in this particular case, I think Evergreen would have—if you take advantage of the state noise law, which is under the law which we are trying to take action here, I think Evergreen could be saved.

Dr. MEYER: Any questions on the left?

(No response.)

Dr. MEYER: Well, thank you very much for pointing out something else which I thought was interesting, and that is to be sure when these center line medians go up, some consideration is given to equivalent walls on the other side. Perhaps we ought to get together with the Department of Transportation on this matter. I can see this, and I'm sure Mr. Botsford would agree with that. I'm quite sure that Mr. Strunk's firm and he have been doing a lot of work on barrier walls and would agree that this is a real problem if they forgot about building one.

Mr. GLEN: When we went back to visit some neighbors in the old neighborhood, we were discussing various problems in their back yard, and from time to time we would have to pause in our conversation as the traffic would roll by because of this reflection from the wall.

Dr. Meyer: Thank you very much.

Mr. Glen: You're welcome.

Dr. Meyer: I'd now like to ask Mr. Al Kolwicz, from an organization which is called PURE, of Boulder, Colorado to come forward. Mr. Kolwicz?

STATEMENT OF AL KOLWICZ, PEOPLE UNITED TO RECLAIM THE ENVIRONMENT

Mr. Kolwicz: PURE stands for People United to Reclaim the Environment. It's an environmentally concerned group of citizens in Boulder.

I want to speak generally about the administration's noise control bill in the hope that the Environmental Protection Agency will be able to bring some citizen input to bear on the final form of the bill.

To my knowledge, the proposed decibel limits would prohibit noise produced only by farming vehicles, certain trucking operations and selected recreational vehicles. These are certainly important sources of noise to control, but this leaves completely unaddressed the lower, but significant, noise levels to which we are constantly exposed from the more usual sources.

If we are to have noise control at all, it should be more than a gesture.

Secondly, Section 6(d) of an administration bill, which I have not personally read, but presumably there is a section which makes it impossible for smaller jurisdictions to set more stringent noise control standards. If a state or municipality is able to offer greater protection to the health and welfare of its citizens than the Federal Government, it should be allowed to do so. Moreover, since actual noise levels depend to a certain extent on local topography and climate, local jurisdictions should be able to set standards based upon these geographic conditions.

We hope that Section 6(d) of the bill will be amended or deleted to allow for stricter local standards.

In short, PURE would like the EPA to help get the noise control bill to cover the more usual sources of noise and to get the noise control bill to allow for stricter noise control standards at the local level.

Dr. Meyer: Fine, sir. After I make a comment as principal Federal official here, would you mind defining for me some of the more usual sources of noise that you have in mind?

Mr. Kolwicz: Certainly. Highways, lawn mowers, construction operations on building sites, the general thing that you are exposed to in your own back yard, if I may say so.

Dr. Meyer: Let me summarize very quickly for you what the present bills pending in the Congress purport to do. In addition to the vehicles and devices and sources that you mention, the administration's bill and that of the legislative branch's bills, all provide in one way or another for the Environmental Protection

Agency setting what amount to emission standards; that is, noise permitted to be produced by equipment or devices or machinery of the following sources: all transportation equipment, buses, trucks, trains, boats, anything of that sort that's used for transportation.

It does not purport to control noise from aircraft, but provides for arrangements between the Federal Aviation Administration and the Environmental Protection Agency with regard to controlling noise from aircraft on a cooperative basis.

It applies to all internal combustion engine devices, lawn mowers, power saws, power augers, auxiliary power plants.

By rather broad definition it includes turbine driven equipment, since a turbine is, indeed, an internal combustion engine. It applies to all construction equipment, riveters, all this sort of thing. Some of the amendments proposed provide for any other machinery or equipment which is driven or powered in such a way as to produce noise which the administrator deems to be harmful to health or welfare. In all of these standards we're charged with taking into account the effects on health and welfare, which goes beyond just health, and also the technology, economics and reasonableness which are the usual safeguards which ought to be put into any law. I might add by health—I should have mentioned this when Nick Pohlit was here—that we are using the broadest definition of health, which is not just the mere absence of disease, but the quality of both physiological and psychological well being, which is a quite different thing from just the absence of disease.

The law also provides that no state or political subdivision may set emission standards lower than those established by the Federal Government for reasons which we discussed with some of the other witnesses here. However, it does not preclude a state or its political subdivision from enacting use restrictions or use standards. I think the thing people get hung up on is this word standard. It's being used in two different ways. One refers to the ability of a city such as the ones you've mentioned to establish all sorts of control measures other than setting a specific limitation on the noise generated by the device. There is a whole variety of ways of doing this, and in support of that activity, the Congress is going to charge the Agency, as soon as the law is passed, with the responsibility of providing technical assistance to the states and their political subdivisions, both with regard to enforcement and the development of capabilities such as was mentioned by the previous witness. The Agency will also be charged with the development of suggested model laws, taking into account that those model laws will be variable depending upon the individual community's needs.

So this sort of gives you a picture of the legislative approach. It's obvious that we're not all powerful, all seeing, all knowing; therefore, suggestions for improvement of legislation addressed to the appropriate committees of Congress are quite in order.

Mr. KOLWICZ: I thank you very much for reviewing that. It sounds very much like our concerns are covered.

Dr. MEYER: I hope they are, sir.

Mr. KOLWICZ: It sounds very much like they are. We support the proposed legislation very much.

Dr. Meyer: Are there any comments from any of my panel on the right?

(No response.)

Dr. Meyer: On the left?

(No response.)

Dr. Meyer: Thank you very, very much.

Mr. Kolwicz: Thank you.

Dr. Meyer: Now I should like Mr. Ralph Hill of the National Wildlife Federation to come forward, please, sir.

STATEMENT OF RALPH HILL, COLORADO WILDLIFE FEDERATION

Dr. Meyer: Mr. Hill, I've been in communication with the National Wildlife Federation in Washington. I'm glad you can be here and give us some comments about noise and wildlife.

Mr. Hill: Well, I'll have to correct that, sir. I am not representing the National Wildlife Federation, but I am representing the Colorado Wildlife Federation which is an affiliate of the National.

Dr. Meyer: Yes, I understand.

Mr. Hill: I'm not authorized to speak for the National.

Dr. Meyer: I understand, sir.

Mr. Hill: Although I think I know their dealings. The Colorado Wildlife Federation is the organization concerned with the natural resources of the country. Our membership is some 3,000, including about 17 or 18 affiliate clubs and various associate members. We are concerned with the protection of our environment from excessive noise, and beyond that I can't get into specific details.

I think you're interested in our feeling between Federal and state laws. We have some members who are concerned about the extensive growth of Federal action as against state. I'm personally not going to get involved. I think we are concerned that the noise be controlled. Whether it's done through state or Federal or both is something that I don't care to get into.

I think that's all I have to say.

Dr. Meyer: Well, let me see if any of the panel might want to ask you a question. On the right?

(No response.)

Dr. Meyer: Fine. Well, thank you very much, sir.

It's now about the time that we ought to take an EPA ecology break, so I will recess for 10 minutes, and then we will reconvene at five minutes after three.

(Whereupon, a recess was taken.)

Dr. Meyer: I should now like to ask Mr. John Harris of J. I. Case Company if he would step forward.

STATEMENT OF JOHN HARRIS

Mr. Harris: Dr. Meyer, this is not as an employee of the Case Company, but as a private individual.

Dr. Meyer: I understand, sir. Tomorrow we're primarily having industry officials, so I presumed that it was as a person or representative of a citizens group that you were speaking.

Mr. Harris: It is my belief that the number one threat of noise in our environment is recreational vehicles. The only reason that we don't have large delegations voicing objections on trail bikes and snowmobiles is that state and local Governments have been able to deal with them with some degree of success. The approaches used by Connecticut are unacceptable to enthusiasts such as myself. Connecticut has banned trail bikes from all public lands.

I own two trail bikes and two snowmobiles, and I enjoy them immensely, but the amount of noise put out by these things has cut down on the places where we can use them. A resort where my family leases a summer place is approximately 250 acres. They have as of this year banned all recreational vehicles other than boats. Now, when a resort starts banning recreational vehicles because of noise, you know, it has to be somewhat of a problem.

In our area in Wisconsin when snowmobiling first came out, the golf courses were open to snowmobiling, school yards, and our state parks are still open to snowmobiling. They have since closed all golf courses for this type of thing because of the noise. Our state parks are still open, but it is somewhat doubtful how long that we will be able to utilize these facilities, and it has to do primarily with noise and concern for the environment.

To relate recreational vehicles to remote areas is, in our opinion, unrealistic. There has been as many as eight or ten snowmobiles in my yard. I live in town. There has been as many as 25 in my neighbor's yard, and a typical snowmobile club outing is to go maybe 15 miles for dinner and then return to someone's home to have a get-together and then leave. This is naturally the wee hours of the morning, and it can't be done quietly, even if it is strongly desired to do so.

The sound put out by a recreational vehicle when one is riding it, such as myself, is not noise; it's music, but put me in my bed on a night I don't make the outing and at 3:00 a.m., then it's noise. Now, we have not been able to utilize our trail bikes because of this noise in the neighborhood, but I am of the opinion, and so are my children, for instance, that it would be far more fun to ride a quiet one than to not ride one at all. The thing on selling quiet, I maintain it cannot be sold, that it must be legislated, and this applies to not just snowmobiles and recreational vehicles but lawn mowers, for instance.

When I am going to mow my lawn, the amount of noise that lawn mower puts out is of no concern. I'm prepared for it. I'm outside. I'm feeling bad because the wife has made me do it, anyway. So I don't mind a little noise, but my neighbor may be sleeping right on Saturday morning, so the concern of the purchaser for the noise put out by that product is not something that will allow him to pay an extra $25.00 for a $200.00 item.

I don't know if I'm putting this idea over very well, but it is only if you are concerned for your neighbor that you'll ever pay any more for an item just to buy a quiet one.

Objections to noise from recreational vehicles take on a very personal aspect. I've asked one of my neighbors maybe three houses down to put the mufflers back on to his trail machines, and, you know, it's not like the people who ban together and they're against LAX or San Francisco Airport. That's a nonentity that they don't relate to personally, but when you complain about your neighbor's children—and in this case I even have my own riding these things—it's a little different aspect. It doesn't take on the type of approaches that we saw in San Francisco at the hearings.

I believe that that's all I have.

Dr. MEYER: Well, you were at San Francisco. Before I ask the panel if they have any questions, I have a couple of points.

You heard, I believe, the gentleman's proposal to instigate a noise tax which certainly intrigues some people and caused shock and dismay to others, I might add. Just to refresh your memory, or in case you didn't happen to hear that particular testimony, I will illuminate the proposal that was made. In essence, what is being suggested is let's recognize that the Federal Government may set some standards and make it illegal to remove or alter or otherwise change noise control devices, and it becomes a very serious offense to do so, but there still is a need to affect some other means of control. Perhaps this plan would exert some pressure on the industry as well as the individual in that one might want to have an annual licensing tax, and that even though the vehicle met the standard but it exceeded the limits for use in certain areas of the city, then in order to go into those areas of the city, one would have to pay a very strict fee every year. One would also have to have an inspection of his vehicle to be sure it was still meeting the basic standard.

How would you feel about having to pay a hundred dollar noise tax on a vehicle if it were 10 dB(A) above a certain level—say the residential area unit at night for your community was set at 50 dB(A), and if you wanted to operate a snowmobile and met a standard at 70, you'd have to pay a hundred dollar use fee on it. How would you feel about that sort of approach?

Mr. HARRIS: I think for me personally to be woke up maybe at 3:00 in the morning and know that this guy that woke me up, it cost him a hundred bucks, it would be very little consolation.

Dr. MEYER: I wanted to get that into the record because that's one of the objections to this idea, because some people just might want to go ahead and do it anyway.

Mr. HARRIS: Now, I did find that suggestion by the man in San Francisco very interesting, but it also has a tremendous amount of drawbacks to it.

Dr. MEYER: Let me ask you another question. I lived over in Omaha, Nebraska for eight years, and they have a fair amount of snow there, and I gather from what you're telling me that some people actually use a snowmobile in a residential area as a mode of transportation, not just as a recreational vehicle; is that correct?

Mr. HARRIS: No, that is not.

Dr. MEYER: That is not correct?

Mr. HARRIS: No. First of all, we avoid public streets. This means that front yards, back yards, that's free game. 'Course, that's a little closer to the house. Now, they're rather free with these things, and I don't mind the fact that someone drives one across my yard at 3:00 a.m. Quite frankly, this right of trespass doesn't really bother me, but if he has to wake me up to do it, that bothers me.

Dr. MEYER: I see. Panel on the right?

Mr. **Norton**: Mr. Harris, could you explain again why you feel that quiet cannot be sold to the public?

Mr. **Harris**: Because the purchaser, the purchaser of the equipment, when this item that he is buying makes noise, he is not only psychologically ready to accept that noise, but he may even desire the noise. The noise enhances the enjoyment of a trail bike out in the woods. It does enhance the enjoyment. I'm not denying that at all, but I'm saying that noise is unacceptable, and, you know, it's got to go and that I would enjoy riding a quiet trail bike far more than riding none.

Mr. **Norton**: Don't you think if it were possible to have funds available to have magazine ads or television ads that extol the virtues of quiet that inform the public or propagandize, if you will, the public that quiet if a socially responsible thing—don't you think that this would be beneficial?

Mr. **Harris**: Beneficial, yes. That it would solve the problem, absolutely not.

Mr. **Norton**: You don't think the public would respond?

Mr. **Harris**: I think that a program of that nature is necessary, but that would not solve the problem. The reason is I'm spending—when I buy a snowmobile, I'll just estimate offhand that a $1,200.00 machine might cost $1,300.00 to be quiet. I'm spending that additional $100.00 not for my sake, because I like the noise, but for my neighbor's sake. Now, possibly I might do that, but there are doggone few that would spend this extra money for someone else's benefit, and it is totally for someone else's benefit. I don't mind the noise of the lawn mower because I'm up; I'm out in the yard. The neighbor who's in bed, he minds the noise of that lawn mower I'm using.

Dr. **Meyer**: Any other questions?

Mr. **Strunk**: John, realizing your capacity as working in noise control, I'm kind of surprised that you would accept the noise of your snowmobiles. I would suspect that you would like for them to be quiet even if you had to pay for it.

The question I have is do you feel—first, before I say that, it seems that motorcycles, trail bikes and this lawn mower, that sort of thing, have historically been loud. No one's tried to quiet them as yet. I wonder if people have been educated to the point that they realize they can be quiet. Do you feel that if we get to a stage where people realize that they can buy a quiet piece of equipment, that they would be willing to pay for it?

Mr. **Harris**: Not voluntarily. I have owned some 15 motorcycles from a Harley 74 down to our present trail bikes, and I'm afraid I have to confess of some years ago of making them louder, especially this here little Honda. The quietness of that thing annoyed me, so I pulled out the inside. Now, it's at a point of either we accept this quietness or we go without the recreation, and that's where I'm quite concerned. There is no question of technology here, really.

Dr. **Meyer**: Questions on the left?

Dr. **Berry**: Yes, I'd like to ask you, Mr. Harris, as I would presume that you're an engineer; you're technically trained; you got a technical background?

Mr. **Harris**: Yes.

Dr. BERRY: Would you feel that the noise control for recreation vehicles is not only technically feasible, which I gathered from your earlier comments you thought it was—do you think it's economically feasible?

Mr. HARRIS: This now depends upon the levels which you're addressing yourself to. Rather substantial improvements from their present levels are both technologically and economically feasible, in my opinion, but when we start talking about levels of—well, I'm not familiar with the levels you might be referring to, so I really would prefer not to answer that question. But vast improvements can be achieved.

Dr. BERRY: Well, I think what I was saying—it was by inference—is that the people who buy recreation vehicles are buying a luxury item, and if the luxury costs a little bit more, it might not be prohibitive from the standpoint of their buying less noise.

Mr. HARRIS: I do not see that the cost of quieting one of these vehicles where it is not something used to produce food and fiber could be considered as a detriment or a serious detriment.

Dr. BERRY: Thank you.

Dr. MEYER: We will be hearing some more from some of the industry. There's another question before you go.

Mr. BOTSFORD: You indicated that mufflers had been removed from trail bikes by your neighbor, and also you'd had a hand in making some of these things noisier. As a user of this type of equipment, to what extent do you think the noise problem of this equipment is due to modification by the user to make it noisier?

Mr. HARRIS: Only nominally, really. Unmodified they are far too noisy, but it is those people where we live on the edge of town—we have maybe 500 acres around us; that is, open, and this is an area for my children as well as other people's to ride these trail machines, and the noise of the unmodified machines—now, I'm not talking about the more quiet of the unmodified machines, but what we might judge the norm—is still too noisy, and they can be made quieter realistically.

Dr. MEYER: We have received some testimony over in San Francisco from a California State Highway Patrol concerning road-type motorcycles, which is a different type of activity than a trail bike or the mini-bike. One of their big problems was willful modification, and I will say in the interest of the motorcycle industry that they have presented evidence that they are working very hard at this problem. Of course, they've undertaken, as they pointed out in San Francisco a less noise, less pollution approach. So one would assume that perhaps the mini-bike or trail bike people ought to try to get after this, too. Maybe we're dealing with a psychological problem, as you've just mentioned. You capsuled it very nicely.

Mr. HARRIS: There is one thing in the scope of recreational vehicle noise. I had stated that complaints take on a very personal nature. It's not against a non-entity or a large organization. Number two, the people, although substantial in number, that are bothered by LAX or San Francisco Airport are confined to that given area. As soon as the planes are 20 miles out, no one's bothered again, but with recreational vehicles there is no bounds. They go to the highways, they go to the yards, to picnics, hunting.

This is why it is a very large problem that should be attended to seriously if we are going to continue to be able to enjoy these vehicles.

Dr. **Meyer**: Sure. Well, I think again, as in some other instances, what we're talking about is noise is unwanted sound. What one person wants may not hurt them; it may hurt someone else badly, though. So to them it isn't noise, but to somebody else, though, it's inescapable agony which ought to be abated.

One of the participants in the audience made the comment that no one so far had addressed themselves to the problem of noise in the home, which typifies this very same thing. Somebody running a waste disposal in their kitchen, for instance. While it might bother them, they still do it. Maybe it doesn't sound bad to them, but at a much lower level, through a thin partition where you've got two electrical connections back to back, the noise is pouring into another room almost as loud as it is in the source room, and it's interfering with someone's ability to hear and concentrate. So we do have a problem there.

The reason I'm dwelling on this a little bit is that when we start talking about setting standards, something that the Federal Government certainly cannot get itself into is legislating morality, at least not in this area. We've got to be very careful that what we do is based on fact, and the facts in this area are rather difficult to arrive at. Most of the people sitting up here at the table have been working one way or another with this sort of problem. In fact, every one of us have been involved in one way or another with environmental insults which require standard setting.

Mr. Norton happens to have been at one point involved in the nuclear energy field, so he knows all about the problems of setting standards there, too, you see. So it's not an easy problem, and you've helped put it into prospective from both viewpoints. I think that was a very fine statement.

Any other comment, panel?

(No response.)

Dr. **Meyer**: Fine. Well, thank you very much.

I should now like to ask Mr. Jerry Plowman of the Dairy Farmers of Colorado and Wyoming, who asked if he could make a brief statement, to come forward.

STATEMENT OF JERRY PLOWMAN. DAIRY FARMERS OF COLORADO AND WYOMING

Mr. **Plowman**: Mr. Chairman, members of the panel, we appreciate the opportunity of saying a word or two here. My colleagues, Mr. Obrecht and Mr. Ahrenholtz, covered agriculture generally. I feel that on behalf of the dairymen perhaps a few words should be said.

In the last 11 years two million dairymen have quit the business in the United States. My remarks here I'd like to preface with a little information in this regard.

The dairy industry is a highly controlled business today, probably subject to more control than about any other business because we're producing food which is consumed almost directly. We are of necessity inspected monthly on our dairy farms. In the last year we've been confronted with problems of air pollution and water pollution, and we've been so concerned about these things that we've almost lost sight of the real problem that we're confronted with, and that is producing quality milk.

Now you confront us with the problems of noise pollution, and we may have some problems in this area since many of our dairy farms are quite adjacent to communities, urban areas, and we would ask that you give some thought and some consideration to any controls or anything that you might feel needs to be imposed on the dairy industry as such.

We operate tractors and some heavy equipment on our dairy farms, and we specifically operate high speed rotary pumps which do create a considerable amount of noise, and we realize that all of us like to enjoy as ideal an environment as it's possible to create. So we would also offer to you all cooperation and help in working out any problems that we might be responsible for within our particular industry.

Dr. **MEYER**: I think, sir, we will want to discuss this with you. See, what will happen here probably is that one hopefully does a better job of reducing general residual or ambient noise levels and they get lower. We would want to work with you because I can see that this does present a possible area of problem, and I should like to communicate with you—

Mr. **PLOWMAN**:—Very good.

Dr. **MEYER**:—to see if we work on this together. As a matter of fact, what we want with every group is to try to work to bring all these interests together.

So thank you very much for making your statement. Just one minute, please, sir.

Dr. **BERRY**: In industrial hygiene we can frequently solve a problem that's of concern to us from a health standpoint because it's a more serious safety problem. Would you have a feeling that perhaps the air pollution problem from a large number of animals in a relatively small space or the water pollution problem which would be associated with this or fly control which would be associated with the manure handling and disposal would take precedence over noise pollution, the bellowing of hungry cattle, the mother cow searching out her calf who's lost in the herd? Would you feel that another problem that you mentioned would automatically take precedence over the noise pollution?

Mr. **PLOWMAN**: My feeling there would be that the problem of water pollution and air pollution and fly control, things of this nature, should certainly take precedence over noise pollution, because I think these are things that might more directly and immediately affect the well being and the health of people surrounding us.

Dr. **MEYER**: I think that I would certainly as a long-time worker in the general field of public health have to agree with this. I think these things have to be rank ordered and put into proper prospective. I'm sure most of the members of the panel, if not every one of us, would certainly say that in this integration of consideration of all elements, some things clearly have to be paid attention to first.

Mr. **Plowman**: May I say one thing more, Dr. Meyer? We would also favor the establishment of certain standards for the production of the equipment, machinery, that we use. We feel that of necessity we must buy equipment to do the job that we have on our dairy farms to do.

Dr. **Meyer**: Yes, sir.

Mr. **Plowman**: And we're more or less victims of circumstances, and we feel that requiring certain standards of production on equipment might benefit us tremendously.

Dr. **Meyer**: Very good, sir. Thank you very much.

The Chair would like to take about a three-minute recess here to discuss something with one of my staff members. We'll just take a little stand-up break or recess.

(Whereupon, a recess was taken.)

Dr. **Meyer**: I terminate this recess and would like to ask Professor Roger Yoerger of the University of Illinois at Urbana if he would come forward. Dr. Yoerger, is it?

Dr. **Yoerger**: Yes.

Dr. **Meyer**: Dr. Yoerger, I've had some contact with some of your colleagues at the University, so I look forward to hearing from you, sir.

STATEMENT OF DR. ROGER YOERGER, UNIVERSITY OF ILLINOIS

Dr. **Yoerger**: Thank you. Appreciate the opportunity to present some ideas to the panel this afternoon. Unfortunately, they are not all new; some have already been presented, but I'd like to put a little reemphasis on certain of those.

I'd like to talk as a member of the agricultural engineering department of a major Land Grant University in the Midwest, and I'd like to present some comments on noise from two standpoints. The first is that of a farmer, Midwestern farmer or farm worker, and the second is that of the standpoint of a design engineer or a company, if I may, that is in the production of agricultural equipment.

Now, the comments on noise are going to refer primarily to those noises that come from the operation of mobil mechanical equipment. This is the type of equipment that's used in the production of food, feed and fiber.

It hardly seems necessary to comment on the importance of agriculture; we've had a number of people do that already this afternoon and this morning, but I'd like to just point out that agriculture in the U. S. is distributed very generally, and in many areas it is the major industry, an industry that's made up of millions of entrepreneurs. Each of these people is free to make management decisions independently. In fact, on a typical family farm, the operator and his immediate family members must make these decisions in areas that range from that of accountant, purchasing agent, machine operator, safety officer and so on down the alphabetical list to veterinarian. What he really needs is information on which to base sound decisions.

Scientific and engineering developments have contributed much to the increased productivity and reduced drudgery of work on the typical farm today. Unfortunately, the relative economic position of the farmer, compared to his industrial counterpart, has deteriorated in the last 30 years. We've had some comment along that line. I strongly urge, therefore, that before any noise regulations pertaining to agriculture are enacted that the cost benefits ratio be carefully evaluated. It affects all of us. Agriculture is currently seeking answers, as was pointed out earlier, to many serious environmental problems, problems in the area of livestock waste management, water quality, sedimentation, pesticide residues and so on down the list.

I'd also like to make a few general comments pertaining to the farm and industrial equipment industry. Now, by industrial equipment I mean off-road prime movers, certain types of construction equipment and machines that are often made by the same companies that manufacture equipment for use in agriculture. This is a large industry producing from four to six billion dollars' worth of goods annually. It consists of about a dozen or so major full-line companies and hundreds of smaller operations. The larger companies may have sizable engineering and research facilities adequately staffed with competent engineers and scientists, some of which will be testifying here at this hearing. The smaller operations, however, are oftentimes centered around one man. This man makes practically all of the decisions, and in this case engineering design, quality control, marketing and certain other functions may leave much to be desired.

The small manufacturer, however, serves a very important role in agricultural mechanization. He is usually aware of mechanization problems at the local level as they materialize and is able to develop and modify machines quickly. Oftentimes the small manufacturer develops new machines and establishes the market potentials before a major manufacturer is able or willing to commit the resources necessary to add the item to its line. The history of successes of many of the mechanization areas can be traced back to an individual idea. Oftentimes these ideas have come from a man who faced the problem directly.

My point in this discussion is that while a high degree of technology is available in certain parts of the industry, a large segment relies to some degree on trial and error solutions. The first group can work toward the solution of noise problems in their own research laboratories and develop the necessary training programs for their design engineers. On the other hand, companies with limited means must utilize consultants, O.E.M. representatives and newly trained engineers to achieve the necessary noise reduction in their products. Considerable time will be required to meet the desired goals.

Now I'd like to comment just a bit on what I think the problem is.

In the past equipment demanded by the consumer each year had to be larger, operate faster and have a greater capacity than earlier models. Because the industry has met these demands, productivity per worker has increased markedly. In 1960 one farm worker produced enough food for 26 persons; in 1970, enough for 46. In the last 11-year period we have made more progress in increase of productivity of the agriculture worker than we had in the previous 1,900 years. It's a very astounding production record.

The result of building bigger machines has generally been an increase in the sound power level and in the frequency of noise associated with machine operation. Major contributors to the overall noise level of an operating machine are the power source, the gear train and the various functional components of the machine. Functionally, a machine may be required to thresh, separate, pulverize, convey, meter, compress or otherwise process materials at a high rate while traversing over ungraded agricultural land. The machine is expected to perform without breakdown and at a reasonable cost when the fixed charges of ownership are distributed over as little as 200 hours use per year. It's not like building a machine for industrial use where it's used three shifts a day throughout the year.

Industrial, professional and public service groups have been concerned about the identification and reduction of equipment noise for some time. Several years ago we initiated the research program at the University of Illinois concerned with the noise and vibration associated with farm and industrial machinery. As the program gained momentum, we invited 15 manufacturers to the campus in October of 1969 for a discussion of the work and possible support of the program. Interest was high, but unfortunately the discussions were followed by a period of financial stress in the industry, and participation to date has been limited to four companies. I might mention these companies are Ford Motor Company, Deere and Company, Donaldson, a major manufacturer of mufflers, and the Switzer Division of the Wallace Murray Company.

The research at the University of Illinois has been concerned with reducing two of the major components of tractor noise, that resulting from the cooling fan and from the engine exhaust. Our goal is to better understand the mechanism of generation and transmission of these noises and to reduce the levels as close to the source as possible. I might just comment a little bit on these two areas. The cooling load on an engine increases with the power output, and as the power output has been going up, the problem of air cooling the radiator design has really magnified. In many instances there just is not enough space available. For example, in a truck you only have so much width and so much height available between the wheels and below, so that the space is really limited.

Now, one thing that seems to overshadow many of these other design criteria is whether or not the fan is operating in a partially stalled condition. Most designs are such that the fan would not be in a stalled condition. However, as the restriction goes up for one reason or another, the grill becomes partially clogged or maybe the speed is increased. The fan operating regent changes, and as a result, the noise level goes up markedly, and some of these other design factors just don't have much effect as long as you're operating the fan improperly. I might say that it is not uncommon to find sound power levels in the range of 110 dB re.

10-12 watts. In our semi-reverberant test room this sound power emission resulted in sound pressure levels of 96 dB re. 0.0002 microbar.

The study of exhaust noise is intended to provide for an analytical modeling of engine exhaust systems using one-dimensional, non-study flow relationships (8). The goal is to provide a systematic means of designing a muffler system for a desired noise attenuation with predictable back pressure effects on the engine. Muffler design is complicated by the many possible frequency components that must be attenuated when used with a variable speed engine. Exhaust noise is a major contributor to the overall sound level for trucks and tractors. Exhaust noise levels cannot always be reduced by just increasing the size of the muffler unit even if space and cost limitations are overcome.

We've been working some with two-stroke cycle engines, the ones you were talking about here, and these do present a real exhaust muffling problem. We have measured sound pressure levels of 140 dB, and putting on a stock muffler might reduce that by 20 dB or so. Still at the exhaust outlet this is an extremely loud noise.

Cooling fan and exhaust are just two of the contributors to the overall noise level of a tractor or machine. Other important contributors include gear, hydraulic system, air intake, diesel injection and piston slap noise. To have an appreciable effect on overall noise level, all sources of similar levels must be reduced. The point that I wish to make is that reducing the sound power levels from agricultural and industrial machinery is not an easy task, because you have to work on half a dozen or more of these major areas.

Now, I feel that the goal with agricultural machinery should be to reduce the noise level to a point where there is not a serious potential hazard to hearing loss for either the machine operator or for associates working in close proximity to the machine. Now, we may have to take another look at our damage risk criteria from what's used in the Walsh-Healy and Occupational Health and Safety Acts. The use pattern for agricultural machines is different from that of industrial equipment. An operator, for example might work 10 to 12 hours per day during a rush planting or harvesting season. However, his total exposure to noisy conditions during the year will be greatly reduced from that of the normal factory worker, and there have been some studies that try to develop the exposure patterns, but certainly not enough in this area.

Even though the noise levels of new machines are reduced below the hazard levels, a problem will exist in agriculture for some years to come, and the reason being that we have existing equipment already on the farm which is excessively noisy. Because of low annual use, the useful life of tractors and farm machines may extend beyond 10 or 12 years. It is important then that operators of such equipment be aware of the hearing loss risk and wear suitable ear protection. Agricultural universities, as was pointed out earlier here this afternoon, the farm equipment industry, 4-H and FFA groups and others are cooperating in an educational program to alert the farmer and farm worker to potential hazards and in actually merchandising ear protective devices.

Now I'd like to just comment a little bit on what I might think would be in order in the way of regulations. This again pertains primarily to the farm and industrial equipment area.

Ideally, it would seem desirable that every piece of new mobile equipment, whether it be engine powered, electrical, battery or what have you, that each piece of equipment would carry a name plate certification of maximum sound power level generated by that equipment in operation. Now, this is not too different from some of the things that we're familiar with today, in terms of the electrical power requirements of machinery, in terms of gross vehicle weight ratings found on trucks and so on, in terms of the heating or the air conditioning capabilities of portable air conditioners and so on.

On a national level I think that the goal should be to work toward maximum allowable values of sound power emission for new equipment that would not present hazards to the operators or to the bystanders. Now, in some instances you may want to go a little bit below this in the case of motor vehicles where you have to take into account contributions by more than one particular vehicle at a given time. However, in the case of agriculture machinery, it seems to me that the normal operation is for a single piece of equipment to be working in a field, and this normally is somewhat remote from any other equipment. I think that the name plate certification would provide a sound basis for selection of equipment for the consumer.

Now, I don't see any reasons why a consumer cannot get some idea of the noisiness that will result from the operation of his equipment before he buys it, and in this way—we talked a little bit earlier about whether or not quiet was merchantable. I think in some respects excessive noise certainly is objectionable, and if the noise level of a piece of equipment is known to be uncomfortable, certainly people will pay to have the opportunity to use quieter equipment. On the other hand, if the noise level is within the tolerable level as far as hearing risk is concerned, I think then it depends upon the operational situation.

If in the case of farm equipment a man is concentrating on the way his equipment is running, or maybe even in the case of trail bikes or some of the other recreational vehicles, the thing a man's really concerned with is how his machine is performing in that instance. He may not be too concerned about making it quieter because he's depending upon the noise to provide a certain amount of feedback.

In farm equipment, for example, we've even thought about trying to isolate the operator in the cab so that the background noise level is way down, and then we put some kind of sound system in with a series of microphones and just periodically cycle around and let him monitor the sounds in these areas as a means of determining the performance of those components. But I think that in many instances if a man knows what his choices are as far as noise is concerned, he would be willing to pay or certainly would avoid buying those that were objectionable.

Now, with this proposed procedure the manufacturer would be faced with a single, uniform criteria for all equipment sold throughout the United States, and as I said, he would be responding then to the consumers' wishes by competing with his associates to produce more desirable equipment. It seems to me that this is really the best kind of regulation that we can come up with in a democratic situation. The techniques for testing and certification of equipment can best be developed and proposed by professional-technical organizations familiar with the respective industries. The actual measurements could be made in the manufacturer's facility following accepted criteria or could be performed as a service in a consultant's or industry supported laboratory.

Now, the next phase—and I think this has been alluded to a little bit—is that the state, municipal and local bodies can then deal with the manner in which equipment is operated and the resulting sound pressure levels that occur with their operation. They would be able to exercise the flexibility necessary to account for land use, zoning, differences in night operation, highway traffic flow and so forth. It would be the responsibility of this latter group then to enforce the regulations regarding the selection, use and maintenance of equipment carrying sound power level ratings.

Considerations of the need of interstate commerce, of course, must be taken into account, and this might override the thing that I mentioned earlier, and it might result in Federal preemption in the case of airport zoning, truck and highway routing and that sort of thing.

Now, if it's not practical to certify sound power level—and I realize sound power level is not easy to measure—some type of noise classification system based on expected sound pressure levels, both at the operator's ear and at a bystander location—maybe the 50-foot location could be used for the name plate certification.

Now, I would suggest that if this were done that there be some kind of a classification, that it not just be a passing classification, so that there would be some credit given for doing a better job than just the minimum, and oftentimes we might find that consumer acceptance then would determine the noise level, and it would be considerably below the maximum that we would establish.

Well, in summary I'd like to say it's important to develop an orderly plan for noise reduction to levels which are satisfactory to society and economically compatible with our goals. The first phase of the plan should undoubtedly eliminate flagrant offenders. These units might very well represent only five to ten percent of the total, but they do cause an unnecessary amount of annoyance, and really, they are the result of an ignoring good practice in design or in operation, and if the bulk of the industry and the bulk of the operation of equipment can meet certain standards, then I think we should move along with great haste in trying to cut out this five or ten percent or whatever it might be.

The next step is to develop realistic goals for reduced noise levels that will encourage manufacturers to use advanced techniques and design know-how to achieve quieter products. In many instances I think it will still be necessary to do considerable research, field testing and retraining of design engineers. This is especially important because many engineers operating in our various industries have had very little background in acoustics. Much of this goes back to a sophomore course in physics somewhere along the line that they didn't understand at the time anyway. While I feel it is important to establish our goals and work toward them in an orderly fashion, I think that a crash program would be a serious mistake.

Thank you.

Dr. MEYER: Thank you, Dr. Yoerger. On my left?

Dr. BERRY: I'd like to ask Dr. Yoerger if he has the feeling that there is an added responsibility at this time for agricultural extension engineers to participate more heavily than they have in the past to assist the manufacturers in providing lower noise levels for their machinery. I predicate that question on the basis of my limited contacts with agricultural engineers, and I don't want to degrade them, but they seemed to be more concerned with making it work than with making it work quietly.

Dr. YOERGER: Well, you mention specifically the extension people.

Dr. BERRY: Yes.

Dr. YOERGER: I think the role of the extension agricultural engineer is more in trying to alert the farmer to the hazards of hearing or possibility of hearing loss and to encourage him to use protective devices when appropriate and to look at potential noise levels of new equipment that he purchases. Now, I think the agricultural engineering people involved in the teaching and in the research area do have a responsibility to work with industry, and as I mentioned, we have a program at the University of Illinois that is partially funded from Federal funds and from certain industry sponsors as well as state funds, and I think that this is a very important function.

Dr. MEYER: On my right?

Mr. STRUNK: Yes, Dr. Yoerger. I have three questions. First of all, you indicate, as many others have indicated, the need to reduce exhaust noise or to develop better exhaust mufflers. You mentioned that you have a program starting. You're working on an exhaust program now at the University.

I wonder, in light of the fact that automobiles today basically do not have an exhaust problem—I wonder if you could expand on the differences between the agricultural vehicle versus the automobile.

Dr. YOERGER: Well, there are several differences, one, of course, being even though the automobile is powered by a 200 horsepower plus engine oftentimes, the typical power level exerted in driving on the freeway or on a highway is usually considerably below that, whereas a tractor oftentimes operates between 75 and 90 percent of its engine capability. So it operates more at the full load, up toward the full load area.

Also, of course, in automobiles they are shielded a little bit more. The exhaust is brought out near the rear of the car, and the car usually is moving at a certain speed, so certainly the operator doesn't hear the exhaust noise.

Mr. Strunk: Maybe there's more opportunity to use two mufflers like they use on most equipment now, most automobiles. I agree with your statement. I just wanted you to expound on that.

Another question is why do you propose measuring sound power rather than sound pressure level to the distance or using this on the name plate when it would be much easier to monitor any variation by using sound pressure level as a criteria?

Dr. Yoerger: Well, I guess I just think that sound power level is a more basic quantity than sound pressure level, because when you measure pressure level, of course, you have to take into account the environment, whether it's in a reverberant condition or semi-reverberant condition. I like to think of this analogous to the air conditioning business.

Most of us would determine the comfort in this room by the temperature, but if we were going to buy an air conditioning unit to put in this room, we would buy it on the basis of BTU cooling capacity rather than temperatures, degrees Fahrenheit, and I think sound pressure level is about the same kind of thing. You have to define much more of the environment that you're going to be involved in.

Mr. Strunk: Well, sound pressure level given distance is about equivalent to sound power level provided you're measuring in the right type of environment, but it seems that it would be much easier to monitor or to legislate the levels of the equipment by just monitoring the sound pressure level to give it distances in a prescribed manner.

Dr. Yoerger: I think that the main use, of course, would be like we use BTU capacity. The average person doesn't know what a BTU is, but if he goes down to buy an air conditioner, he can pretty well decide what size he wants, and it's more a comparative thing. If you had a piece of equipment that came up with a certain sound power level rating and you went to buy another piece of equipment, you could compare those ratings. If you went from one size to a larger size, you could still compare the ratings. I think this is the main reason that I proposed that.

Mr. Strunk: I like your approach of having a rating scale where people would be given credit for beating the standard.

The other question I have, my last question, is you indicate that there would be considerable time required to meet the desired noise rules. I wonder if you would expand on this in light of some of the regulations which are now in existence. Do you feel it's possible to meet the time scale established?

Dr. Yoerger: Well, we in the State of Illinois, of course, are looking at state regulations in conjunction with proposals from your company, and we also have the regulations in the State of Chicago—City of Chicago—

Dr. Meyer:—Getting ready to have a repetition of the New York situation.

Dr. Yoerger:—and I think it's very difficult to predict just what we can meet in 1985 or so, but when we're talking about 70 dB(A) for an operating vehicle or operating machine at a bystander distance. I think this might be very difficult to meet in some instances, and I would hope that we do look at these values very carefully, and as someone mentioned earlier this afternoon, that we could come up with goals that certainly are realistic and things that we can meet within the cost criteria that we're willing to pay.

Dr. **Meyer**: Any other questions on the right?

Mr. **Botsford**: I'd just like to comment on the grading system you mentioned. As I understood it, you wanted to classify the noise by groups, something like that, in order of loudness?

Dr. **Yoerger**: Yes. My thinking there was that we would have the one level that would be acceptable; this would meet the maximum levels that would be allowable, and then we would have a couple grades better than that.

Mr. **Botsford**: Well, I'd kind of like to see that kept on a numerical basis myself. I know some of the home appliance manufacturers have gone in that direction. I think it would be a lot simpler in the long run if we'd just stick to a numerical rating.

Dr. **Yoerger**: One of the things, I think we sometimes put these numbers down and we attach too much accuracy to them, both in the categories that we put down and also in trying to enforce them. I sort of feel that the sound level meter may be a good candidate for the most misused instrument of the 70's.

Dr. **Meyer**: Seems to me we heard that over in San Francisco. In fact, I even heard a proposal from one highly qualified member of the acoustical community that we ought to throw all the sound meters away. The points that are being raised here are germane not only to this problem, but to several others, labeling of household appliances for instance. The housewife doesn't know a dB(A) from an RPM, and we ought to be able to identify for her how these things rate. There's been a great trend, as you know, to put everything into dB(A) because it equates how the human response is to noise. There's some people who have begun to think about energy going back and saying that that is a good source identification, that's at least a tool for the magnitude of identity of the source. However, it does not identify the effect of the noise on people.

It looks like this is an area that various professions, including the legal profession, will have to help us enforce, as well as the scientists within the acoustical group and the general public. They're going to have to come together and do a little bit better job in this area. Just to keep the thing in focus, I'm not taking dB(A) versus other means. I'm just saying there's a need which you have spelled out here.

The thing that intrigued me from your point is that there is a need for industries and universities to work together with the Government. This is certainly part of our technical assistance area of interest.

So if there are no other questions we thank you very much, sir.

At this point, we are sort of setting the stage a little bit for tomorrow—then we'll return to some of our general public witnesses and other interested people. I would like to ask Mr. L. W.

Randt of the Farm and Industrial Equipment Institute if he would, indeed, come forward, and, Mr. Randt, I see you've provided us with some extensive material, all of which as can be appropriately inserted in the record will be or else indicated that it's on file in our office. I think there are several of these things that will be incorporated into the transcript, including your full statement, sir.

STATEMENT OF L. W. RANDT, FARM AND INDUSTRIAL EQUIPMENT INSTITUTE

Mr. **Randt**: Mr. Chairman and panel members, my name is L. W. Randt, and I am the Safety Program Coordinator for the Farm and Industrial Equipment Institute. Our Institute, commonly known as FIEI, is a trade association which was founded in 1894 and through its 240 active member companies manufacture and market more than 90 percent of all the farm and industrial equipment produced in the United States. The verbal report I'm about to give is an abbreviated discussion of the total paper we are submitting to this hearing body. The formal report includes a substantial amount of technical data on various aspects of agricultural noise abatement and control. We respectfully request that the full report rather than the brief report being given be accepted as the official hearing document.*

FIEI has throughout its history maintained a strong interest and leadership in encouraging progress in those matters affecting the health and welfare of the American farmers. Throughout the years our membership has cooperated with many safety concerned organizations having a like interest, such as the National Safety Council, the National Institute for Farm Safety, the American Society of Agricultural Engineers, the Society of Automotive Engineers, the American National Standards Institute and the International Organization of Standards.

FIEI has since 1927 been involved in the U. S. voluntary standards program for agricultural equipment powered by internal combustion or IC engines. As a result of this long-term history in national and international standards activities, our industry has become well experienced in introducing technology consistent with economic and social demands.

We welcome this opportunity to appear before you at this hearing and to review the subject of agricultural noise as it relates to the urban and the farm populous.

We have searched through a substantial list of studies, including those funded by Governmental agencies, and do not find that agricultural sector noise is a general problem in the general welfare portion of the noise spectrum as distinguished from the health and hearing loss portion. We are assuming that agricultural noise is included in the EPA review, because much of our equipment is powered by an IC engine. Agricultural machinery is certainly not construction machinery. It is not transportation equipment, nor is it recreational vehicles or related equipment.

In the industry's program for noise concern, the noise emission spectrum has been divided into two portions; that is, that affecting health and that affecting the general welfare. For consistency in this presentation, we plan to use the term ambient noise to represent the environmental community, bystander, spectator, drive-by, nuisance noise as the welfare portion of the noise spectrum.

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*This material is on file at the Office of Noise Abatement and Control.

Voluntary efforts for agricultural tractor and machinery noise abatement and control is directed to achieving noise emission levels based on presently recognized exposure limits and actual agricultural exposure patterns which will not cause hearing damage to the operator or be detrimental to his health.

A clear understanding of usage and field factors related to the utilization of IC engines on American farms, coupled with the knowledge of environmental factors, are important to any consideration of noise. Unlike manufacturing or high density urban noise exposure, agricultural work is highly intermittent, geared mainly to a brief planting and harvesting time. Power usage is limited during winter and growing periods, and power usage is synchronized with nature to produce intermittent use characteristics.

The Morrill Act of 1862 recognized the diversity of the agricultural environment and established a host of local experiment stations to relate science to local conditions. Because ground conditions vary from hard to soft, tillage from deep to shallow, terrain from low and wet to hilly and slippery and crops from light to dense and tangled, we find that machinery utilization varies from east to west and from north to south.

The one-man 400 plus acre hog farm or 235 acre dairy farm or 440 acre cotton farm or 760 acre corn farm or thousand plus acre wheat farm represents a significantly different noise and economic problem than a multi-shift factory filled with machines and people, a multi-lane highway filled with cars and trucks, an airport moving jets at one and two minute intervals, or a high machine density construction site.

The agricultural machinery industry's noise control activities in the early 60's predates society's general concern for noise. In May, 1966, our industry published voluntary noise standards and noise measuring criteria. These were SAE Standard J952, titled Sound Levels For Engine Powered Equipment, and SAE Standard J919, titled Measurement Of Sound Level At Operator Station.

In 1967 FIEI co-sponsored a noise research project with the U. S. Department of Transportation, the Construction Industry Manufacturers Association and the Power-Saw Manufacturers Association. The results of this research were published in December, 1969, as a Technical Report, SAE Research Project R-4, titled A Study of Noise Induced Hearing Damage Risk for Operators of Farm and Construction Equipment.

Dr. MEYER: I believe one of the participants in that study is going to testify tomorrow, sir.

Mr. RANDT: Yes, sir.

Dr. MEYER: Thank you, sir. Go ahead. Pardon the interruption.

Mr. RANDT: The Department of Agriculture at the University of Nebraska in Lincoln, Nebraska, in cooperation with our industry, has long tested industry tractors. Several years ago they began to record some noise emission data, and then began to formally report the results in their 1970 test reports. This noise data, as measured and reported, are not easily interpreted or usable at the purchaser-consumer level. The data, however, is important in measuring noise control progress and defining the current state of the art.

We are submitting a 1971 SAE paper titled A Modular Cab for Farm Tractors which illustrates the complexity of interpreting agricultural noise data and noise abatement measures. This paper records the substantial noise abatement progress of a new, high horsepower, articulated farm tractor equipped with a new tractor cab developed by an independent cab manufacturer and illustrates the total number of noise control variables involved in reducing the noise level at the operator station.

Agricultural economics must be considered in farm noise abatement. We have alluded to the fact that farm machinery is used only intermittently. A farm tractor may operate from 500 to 700 hours per year in contrast with industrial sector machines which may operate from 2,000 to 4,000 hours per year. The earning power to pay for machinery is first limited in that the farmer pays proportionately more for his supplies than he receives for his products. Farm capital requirements are exceedingly high in that a one-man 760 acre corn farm may require a capital outlay of $450,000.00 and provides a net return of only $30,000.00. This type of capital necessitates extensive borrowing and a high interest loan.

The earning power of farm machines operating for one-fourth the time of industrial machines in relation to a limited farm income determines to a large degree the noise control investment that can be made in a 26 billion dollar farm machinery inventory.

In reviewing the available library of the harmful effects of agricultural machinery ambient noise, a search of 127 papers failed to identify agricultural ambient noise as an important source of irritation or annoyance. Ambient noise control is automatically being accomplished through the efforts to control the noise at the machinery operator station.

Ambient noise reduction will continue to follow operator station noise reduction progress unless unrealistic ambient levels are imposed.

The agricultural machinery industry's long-term efforts to reduce noise to voluntary standards and research and test procedures is recorded in a charted comparison of noise level of 1957 low horsepower tractors versus 1970 high horsepower tractors. This chart depicts the noise control progress of the industry in moving from low to high horsepower tractors. A second charted study titled Comparison of Noise Level For Tractors Tested in 1966 and 1970 was old and new model comparisons in specific horsepower classes and again records a progress.

Due notice should be taken of the many variables consistent with the agricultural environment. This pertains to environmental as well as physiological factors. There is no recorded data on the differentials that may exist in the hearing capabilities of the farm wife, daughter, son, owner-operator or hired help. Each member of the farm family, while residing in the farm environment, has a different exposure to IC powered farm machines. Agricultural hearing loss data have not been developed in conjunction with or related to an agricultural control group, and comprehensive exposure data is needed in this area.

Mr. Ruckleshaus stated before the Senate Subcommittee that "while a number of studies have been made on the noise problem, there is still much that is not known." FIEI believes that this statement is particularly appropriate for the agricultural sector using IC powered machinery. IC powered and farm machines are used primarily in open, distance-protected spaces, non-urban situations, generally as part of a system of equipment in seasonal and intermittent operation. Industrial sector findings are not applicable to the agricultural sector. It is most necessary that research be accomplished before agricultural noise control is attempted.

Such research might be directed to the following areas. Determine if there is any detrimental urban exposure to farm machinery noise. Determine if there is any detrimental bystander or operator exposure noise in relation to definite intermittent use patterns characteristic of agriculture. Determine if there is any detrimental bystander or operator noise exposure to farm machine systems working in proxity to each other. Develop information on the cost effectiveness of new materials and new design criteria and new manufacturing processes related to noise reduction. Investigate the cost benefits and trade-offs that are feasible in noise reduction and relate to the farmers' ability to pay and exercise purchase options. Determine the durability of noise suppression equipment in relation to the very extended life of some farm machines.

Since farm equipment is used in open spaces away from the public, we believe that agricultural equipment falls within a category of equipment which Mr. Ruckleshaus defines as "some specific types of equipment . . . for which standards will not be necessary or desirable because they do not represent a threat to the public health and welfare."

We note that proposed legislation, particularly S.1016, provides for the setting of noise standards by EPA for construction and transportation equipment, including recreational vehicles and related equipment, or equipment powered by IC engines.

FIEI urges that any legislation providing noise control recognize the control authority which has already been granted to other Federal agencies and thereby avoid duplication of effort and conflict of regulation. Such cooperation exists in the arrangement between the U. S. Department of Labor and the U. S. Department of Agriculture in matters pertaining to agricultural safety and health regulations under the Occupational Safety and Health Act authority.

S.1016 provides for a priority and preemption for EPA noise standards in that no state or subdivision thereof shall adopt or enforce any standard limiting noise-generation characteristics different from the standards prescribed by the EPA Administrator. FIEI recommends that there should be a Federal preemption of all state and local action on agricultural noise control while Federal studies are being conducted, while Federal standards are under development and during any period when farm equipment is administratively exempted from Federal regulations.

S.1016 needs to be amended to accomplish this result. We accordingly endorse the principle Mr. Ruckleshaus submitted to the Senate Subcommittee when he stated, "Our proposal recognizes the need for uniformity throughout the nation if these three categories of equipment are to be equitably controlled without any undue disruption of the manufacturing process. At the same time, we recognize that there are differences in requirements for varying types of geographical regions and areas within regions as to the use of such equipment."

This statement is especially applicable to farm equipment and the national and international farm environment.

S.1016 proposes that EPA may designate certain products or classes thereof to be labeled with a notice of the actual level of noise generation or notice of the actual effectiveness in reducing noise as information to the ultimate user.

Sound measurement in agriculture is complex and subject to a broad range of variables. Noise generation in agriculture is a compound and complex problem. Manufacturers have had to develop relatively complex procedures for the measurement of sound level at the operator's station. Measuring and analysis of noise levels for the agricultural environment requires skilled technical interpretation, and consumer labeling has severe limitations in transmitting a complicated technical read-out into a comprehensible consumer language applicable to a local field condition.

In closing, duplication and conflict of Federal Regulations on noise should be avoided, and where farm equipment is concerned departmental cooperation between the Environmental Protection Agency, the Department of Labor and the U. S. Department of Agriculture is essential.

Noise emission labeling for agricultural machinery is extremely complex and meaningful communication to the consumer is accordingly severely limited and must not and cannot be treated lightly.

Any Federal action in connection with the noise control of farm equipment should preempt all state and local action in areas designated to be the Federal responsibility.

Should EPA determine that additional work is necessary on the ambient noise situation, FIEI, as always, stands ready to draw upon its resources in cooperation with the Government.

Farm equipment manufacturers have made and are continuing to make very real progress in the area of noise abatement on and around farm machines. FIEI believes that this voluntary initiative and progress will continue and that the addition of more scientific data will maintain a satisfactory level of noise protection for the farm populace.

Thank you, sir.

Dr. MEYER: Thank you very much, sir. I think that from what we've said earlier that most of the points that you are raising and calling to our attention with regard to legislation are being taken care of, assuming the legislation is passed, as to how we will proceed administratively.

Any questions, panel, to my right?

(No response.)

Dr. **Meyer**: Left?

Dr. **Berry**: I'd like to ask Mr. Randt about the genesis of the Nebraska tractor tests with those initiated by FIEI. Was there an industry concern over uniformity of performance, or was there some other basis for the original Nebraska tractor test?

Mr. **Randt**: No, I think the Nebraska tests were initiated in the late '20's or early '30's as a result of a law that was passed and is under the jurisdiction of the Nebraska Railway Board, but what has happened in this association is that an industry and an agricultural academic group came together and have worked cooperatively throughout all of these years, and there exists, I think, an absolutely unique cooperation.

We have been able through this agency to advise the farmer to let him make those decisions that he might be capable of making. Although I think even the tractor horsepower tests are difficult to read, we in the industry—I personally make a different chart than everybody else uses in order to understand what is going on, but it has established a competitiveness, if you please. I think it's a unique competitiveness.

We were speaking of where does the incentive come for an industry to compete on some reasonable basis. I think the Lincoln test does that for this industry, and it's gone on for well over 30 years, and I think we're very, very proud of it.

Dr. **Berry**: This leads me then to the second question. Was the measurement of noise at the Nebraska test something which was initiated at the request of industry, or was it an idea which originated with those people in Nebraska in the College of Agricultural Engineering?

Mr. **Randt**: I really couldn't pinpoint who exactly started it. All I can say is that when there is a common interest, generally both groups have come together, because, you see, the industry does supply the equipment; they do pay for the testing, and it's one of those beautiful cooperative things, I think, that's unique in this country.

Dr. **Meyer**: Doctor, I think you maybe can get that answer directly from the Nebraska witness during a recess.

Dr. **Berry**: All right.

Dr. **Meyer**: Thank you very much.

At this point then I should like to ask Mr. Bernie Goetze of the Wildlife Conservation Office of the Colorado Division of Game, Fish and Parks if he's here. Please come up, sir. We'd like to hear from you.

Before you start, our young lady needs a few minutes' break here. We'll take a five-minute recess.

(Whereupon, a recess was taken.)

Dr. **Meyer**: Mr. Goetze, I'll repeat again we're very glad to have you with us, sir, and look forward to hearing from you.

STATEMENT OF BERNIE GOETZE, COLORADO DIVISION OF GAME, FISH, AND PARKS

Mr. **Goetze**: Thank you very much. I'm here representing a minority group that can't speak for itself, that we have to take into consideration with these modern advances in technology the noise rate to us and to wildlife is two different things. Wildlife use their ears, their senses, to determine danger and how to escape from it. It's something that they have highly developed.

Noise levels to us which do not bother us can be very detrimental to wildlife. Wildlife can get along with noise. It's very possible. You see different animals around developments where there's a lot of noise going on. We know that they can get along with it. Probably the effects of noise, constant noise, is less than the intermittent noise that comes unexpectedly and at times that animals are not expecting it and are trying to go through their life cycle and can be very destructive to them and to their life cycles.

Now, the items I'm talking about cannot be backed up with technical data. We don't have it. The Division of Game, Fish and Parks in Colorado is not running any studies as to effects of noise on wildlife. We have had a few studies in the past where they tried to determine what effect the hunters moving into their camps before season have had on wildlife. We know definitely that there is a tremendous effect by the hunters moving in the field to their camps, setting up and so on like this of actually chasing the animals out of different areas, only to have the animals move back after the hunter has left.

Now, these effects, I think we can pretty well realize what's going on here, but what is the effect of the different noises to the animals at a later date after the hunting season? Our hunting seasons generally come at a time between the mating of the different species, primarily in Colorado between the elk mating time, which is in September, and the deer mating time, which comes in late October going on to December. In between these times the hunting pressure by the thousands of hunters we have every year doesn't generally affect the reproduction, but what happens when we have noises during the times of actual peaks of reproduction and times during the period that the does are carrying their young—and we know that wildlife are quite secretive in their habits. They like to get away from the people. We also know that noise is associated with movement. Any time we have people moving around, equipment running, you're going to create noise, and this is going to disturb the wildlife.

Another factor in this is that noise or disturbance to wildlife, the effects are many times short-lived, and people saying, well, if we create a noise today, we won't hurt this doe out here right now. The process of just making a noise may not cause any physical damage to the doe at that one time, but can the doe get along with noise that's intermittent over a long length of time in such a capacity that the animal cannot carry its proper life processes on in such a manner as not to be interrupted? Wildlife are very high strung in nature. Their nervous systems have a higher pitch, you might say, than what the human body has, and little noises, little disturbances, can keep this animal in a high state of tension for a long length of time.

In working with wildlife you come to the situation that you find out just how much tension or how much disturbance an animal can stand. I've trapped animals, for an example on this, and had them very distraught with our being there just walking around the trap. I've seen these animals in perfect health early in the wintertime when their body contains a large supply of food and fat in one minute raising cane trying to get out of a trap and the next minute be dead from the effects of a human being around them due to their high rate of nervousness.

Now, any time a disturbance occurs that the animals are not prepared for, it can cause a higher rate of body functioning, and the stress and strain on these animals over a length of time during critical periods can cause death or reduction in the reproduction of these animals. Now, critical periods of time come in late winter when their food goes down. Many of these animals are relying on the amount of food they have been able to store as fats in their bodies. Now, you take snow machines moving through snow in the back areas where these animals need peace and quiet and relatively little excitement to live through the winter, you get man moving around causing noises, these animals become distraught. They have to find other areas of peace and quiet so they can calm down.

The high tension causes the animals to have a higher rate of metabolic use of fat and so on to point that their safe reserves can be used up causing the animals to go into a period of relatively low food coming in the late winter. We don't know what effects these have, but in many cases you can see that—you go back in the spring and you see the reproduction by these different herds has dropped, has dropped noticeably, to the point that you wonder what the type of season you should have for next year because the reproduction, the young animals, which you have to count on for a major part of your season kill aren't just there. They're missing. Where did they go, what caused them to be missing, many times is hard to say. You try to investigate and find out what the causes are. Many times you find that with animals that are caused by road kills, road kill animals; put it this way, you check the reproductive organs for signs of fetus and stuff like this, and many times you find that there has been abortion. What's caused these abortions? Many times you can't find out why, something that you can really put your finger on as the reason, but if you get investigating the history of that winter, what kind of disturbances these animals had, many times you'll find that the encroachment of man with his technical knowledge and noises caused from the equipment that he has to use the carry on his work and his development has caused these animals to move to new areas.

Many times these areas are places where food is of poor quality. Man so many times has a habit of moving into the stream bottoms, the places that are easy to move into, that have the most moisture, the best food available. As man moves in, wildlife has to move out 'cuz they just can't get along, and the wild animal has to go and try to escape man.

The animal then will move into back areas, many times higher country, where food is of poorer quality, and you cannot retain the nutrition in the animals' body that is needed.

Now, these things are things that we assume happen. We can't say that this does happen. We have no way of researching at the present time. So we have to go on assumptions, and we have to keep our technical methods of reducing sound, noise, that will not bother man and will not bother wildlife also. In doing this we have to figure out maybe what sounds will be disturbing to a conversation. Is this sound rate that animals can live with, or should it be lower than this, or should we consider that certain areas of our country should be limited to certain types of operation of vehicles for the protection of the wildlife in that area.

Now, with this type of regulation there's lots of problems. We have to figure out what we want and figure out what this is going to cost us. Now, any time you move into a new area with a housing development or a factory or some type of development of such, you're going to push out the wildlife in this area. Now, some animals, we know, are going to live and benefit from this. One of these is the coyote. He's pretty good at getting along with people, but can our big game animals do this? Can the bear, the deer, elk, big horn sheep, do the same thing as the coyote has done? In many instances they can't. They may be able to sit there and watch a road development go in, watch equipment, but as a highway is developed, more people move into an area, and with the combination of noise and movement, the animal eventually gives way to man's progress.

Now, as I said before, we're going to have to decide where we're going, what we want to give up and what we want to keep. Every time we attain something, it's going to cost something in another area. Due to this I feel the same as the Department does. We must set up standards of noise to where the wildlife can live at peace with nature and with man. We have to consider them as a kind of a little brother that can't speak up for itself and look into their protection in developing these technological advancements that we need.

Most of the representatives that have talked before this Board have talked about the sound effects to machine operators, to the bystander at certain distances from the operation of a machine. Machine operators can go in there and get hearing aids, equipment which cuts down sound. They can sit in soundproof cabs or control booths. The bystander, as long as they are humans, can take methods, take steps, to cut down the amount of noise that will be affecting them, but this is not true with wildlife. For instance, a bear can't walk into a sound effects store and buy a pair of earphones to use out in the tules where they're roaming around. We have to consider them in a different manner. What is our sound level compared with theirs? What is safe for us, is it safe for them?

I wish I could give you some data, something that is hard and fact that you can put your finger on. I can't. This is a problem that we run into when you're working with something as intangible as the human effect on wildlife. I only hope that with the technological advances that each of us will keep in mind the other person, and in this case I mean wildlife, the effects on them and what it will eventually do. If we want wildlife to be around, we must protect it. If we don't care for the value that they give us, which is millions of dollars of recreation every year—it's a multi-million dollar industry in itself.

If we want to do away with these items, if we want to do away with the esthetic value of having wildlife, then we don't have to give any thought to these animals or to wildlife in general, but if we want to keep our world much as it is today with wildlife around so we can enjoy nature somewhat as it is today or it has been in the past, we have to stop and think that care has to be taken.

You say where's the money going to come from to cover this? Well, each of us is going to have to say—we're going to have to allow a certain amount of money for the protection of this area of the population of the world, and in doing this we can't say the consumer has to take this cost. Many times it's going to have to be the producer. He's going to have to take this out of his pocket in order to provide this type of protection for an area that cannot protect itself.

Dr. **Meyer**: Well, Officer Goetze, you've outlined some problems. You're right, the animals can't go and buy earplugs, although I saw one of our group contractors who are helping us prepare a report to Congress making a study of problems around the world, and he gave me a picture of some elephants being loaded on an airplane in Thailand. They couldn't get them on the airplane because the noise of the jets scared them. They had to go out and fashion some gigantic huge earmuffs. You laugh at this. It actually happened.

I'm not belittling the problem because it is a problem. You're a very eloquent spokesman for that silent minority represented by the animal kingdom, and you may already know from discussions with Dr. Fletcher that my Agency, the Environmental Protection Agency, is engaged at the present time in some studies on effects of noise on wildlife. While we're going to include in our report, it clearly indicates the same thing that you've said, that unfortunately, this is one of those times where we really have to say we've got to study the problem some more. Wouldn't you agree, Dr. Fletcher?

Dr. **Fletcher**: Very decidedly. Everything you say is essentially true. Unfortunately, we have little information of any more scientific merit than what you have just said with the result that in order to move with knowledge, we're going to have to do a basic research on your wildlife to determine the effects. Some of them you haven't mentioned, but I'm sure you may have thought of things like prey predator relationships or various mating calls or other signals which could be masked out by higher noise levels. It isn't just the physical damage to the organism per se that we will have to worry about. We will also have to worry about interrupting his food chain and his life cycle and even some of his customs and quirks and so forth. With deer probably we have quite a bit of time to worry about this. We have a lot of deer. They seem to do well in quite a few different areas, but with animals that are already on the endangered species list where any little disruption such as one year's nesting being wiped out or something like that, then we don't have time, and we can't afford to make mistakes because one mistake and we've wiped out a whole species which we could not bring back. So we do have some severe problems which have been inadequately re-searched and are very much in need of more work and help in the area.

Dr. **MEYER**: Thank you, Dr. Fletcher. You highlight again another problem, that we have a multiplicity of environmental insults, particularly where endangered species are concerned. Some of the pesticide problems and others, maybe noise, become the last insult.

Any other comments, panel?

Mr. **NORTON**: One quick question. You said that Colorado Game, Fish and Parks is not now studying the impact of noise on game animals; is that right?

Mr. **GOETZE**: Yes.

Mr. **NORTON**: Are there plans for such studies in the future that you're aware of?

Mr. **GOETZE**: None that I am aware of, but I would believe that this is certainly an area that we are looking into. We have a planning section that is trying to cover the different problems that wildlife are having in the State of Colorado, and we know definitely that noise does have a very definite effect on the animals, and this would be one of the items that I'm sure will come up in the future.

Some of the legislation that we are proposing or backing will be given later by another speaker from the Division that can probably answer your question a lot better than I can in this area. We are backing some legislation, and this will be brought out later.

Dr. **MEYER**: Well, thank you very much, sir. I appreciate your taking time from your duties and hope that you'll stay around for a while. Thank you.

I should now like to ask the representative of the Colorado Motorcycle Dealers Association, Mr. Al Hein, if he would come forward. There's been a great deal of discussion about the motorcycle. We've heard some testimony from representatives of the motorcycle association, the Motorcycle Industry Council, in San Francisco. I should now like to hear from those here because that testimony was primarily on road use and heavy transportation, with the understanding that some discussions on recreational aspects would be given here. Mr. Hein?

STATEMENT OF AL HEIN, MOTORCYCLE INDUSTRY COUNCIL

Mr. **HEIN**: Thank you very much, Dr. Meyer. We are very pleased that we had the invitation to visit with you folks this afternoon, members of your distinguished panel.

Dr. **MEYER**: I see you brought some samples along with you, too.

Mr. **HEIN**: We sure did. We believe that this is show and tell time.

Dr. **MEYER**: I see. Well, all right. Proceed.

Mr. **HEIN**: There are, of course, many, many problems involved in noise abatement nationwide, and, of course, we have tried to meet many of these problems here in the State of Colorado. I have some facts and figures here for you on your agenda, and the most pertinent one perhaps is the fact that we estimate over

110,000 two-wheel vehicles in the State of Colorado, and of those 75 percent of them are capable of being ridden in the recreational areas of the state.

We know that the recreation industry is a very rapidly growing one, and to give you some idea how the motorcycle industry is growing, in 1969, compared with 1970, there was a registration of over two million vehicles in the United States. The motorcycle industry itself has shown an increase over 1969 of a little over 11 percent, while the rest of the industry generally, vehicle industry, is growing at about a three percent rate.

So we see that because of recreation growth in just one area, and then compound the problem by realizing that there are many, many people who are interested in other types of recreational activities, we go back to this thing called multiple land use principle, and it's one that we have been living with for a good many years, and we find in the area of recreation that hikers prefer to have it very quiet. Horseback ridders would like to have their recreational activity. Motorcycle trail riders like to have theirs, snowmobiles and so forth, and therein rests the problem, because noise not only bothers the animals perhaps that we have been discussing, but it seems to bother our different recreational groups.

Now, in an effort to help solve this problem, we in the State of Colorado passed Senate Bill 197, which is a noise abatement bill, and members of your panel, you'll be provided a copy of this bill for your future reference. I would point out to you it's our opinion, even though we worked with this, we feel it's a step in the right direction, that it does not solve the problem of noise abatement in the recreational areas of our country or the State of Colorado.

Later you will hear some testimony from a gentleman from Boulder who has been very active in noise abatement enforcement on a local level. It's also our opinion that local noise abatement ordinances are not going to solve the trail riding problem again in the hills and mountains of Colorado, but we do feel that a bill that was introduced by our Association—and you will hear it discussed a little later—is a solid beginning to help perhaps serve as some kind of a model that other states could use that will alleviate the noise problem. We know we have a long way to go.

Dr. **MEYER**: We're vitally interested in model legislation, so we'll be pleased to hear about it.

Mr. **HEIN**: Now, you have been presented a folder of this type. Everything is indexed. You will have copies of the legislations, regulations and so forth.

Dr. **MEYER**: I see it's coming.

Mr. **HEIN**: Very good. Now what we would propose here, I would like to introduce to you Mr. Bymaster. He will then introduce the next individual, Mr. Verna, who will testify and give you a demonstration; that's show and tell time, and then another member of our testifying group is Mr. Bovee from the State Game, Fish and Parks Commission, and then at that time I would hope that you would ask questions.

Dr. **MEYER**: Yes, sir. The record will show that we've received your additional materials.

Mr. **Hein**: Thank you very much, sir. At this time I'd like to introduce Mr. Don Bymaster who is the President of the Colorado Motorcycle Dealers Association. Don is also the representative to the Federal Motorcycle Industry Council, and he will give you some ideas of what he found out in San Francisco, and he'll tell you some of the objectives that this Association has to help solve these problems. Mr. Bymaster?

Dr. **Meyer**: Mr. Bymaster?

STATEMENT OF DON BYMASTER, MOTORCYCLE INDUSTRY COUNCIL

Mr. **Bymaster**: Thank you, Mr. Hein. Thank you, Mr. Chairman. Ladies and gentlemen.

First, I'd like for you to all join in the noise pollution revolution. We have stickers and buttons here for everyone present. If you'd care to take part, we think it's a whale of a movement.

The Colorado Motorcycle Dealers Association and Motorcycle Industry Council are in sympathy with the need for noise control. No one citizen should have the right to offend others with noise any more than he should have the right to be offensive in any other manner. This is why we already have laws concerning disturbances and public nuisance.

We members and affiliates of CMDA and MIC urge all dealers, manufacturers and riders to help in the fight to eliminate noise. Quieter exhaust systems are a must if we are to live in harmony. Thusly, the following resolution was proclaimed on April 14th, 1971, to wit: After December, '71, no manufacturer will produce a motorcycle with a noise level over 92 decibels. That 92 decibels covers any type of usage. In addition to this resolution, we have launched a public awareness campaign to support it. A kit was sent to every known motorcycle dealer in the United States and Canada which included these Less Sound More Ground buttons, posters, such as you see here, and other general information designed to demonstrate to cyclists and the public at large the motorcycle industry's effort to self-regulate and control the noise problem.

For example, we have proclaimed this resolution, which you have copies of there. Various odd manufacturers, notably Kawasaki Motorcycle Company of America, designed such things as in our company colors the noise revolution, banners and stickers, as well as the buttons, and they went to the trouble of printing under their heading and sending to each and every dealer in the United States of their brand the Kawasaki motorcyclists' fact sheet. You also have copies of that, which I think you can run down if you'd like.

This is the first time any vehicle industry group has launched an attack on noise pollution created by its own products. Also, this is the first time any state in the United States backed by an industry group such as our own has passed noise pollution acts of any kind such as Bill 197.

The Motorcycle Industry Council represents 95 percent of the motorcycle manufacturers and importers in the country, so it's not as if we're going to have stragglers, somebody not willing to comply with the rules and regulations. The industry has been aware for a long time that one excessively noisy cyclist who has thoughtlessly removed the baffles from his mufflers or possibly installed straight pipes can easily mislead the total public, as well as the authorities, into thinking all cycles, regardless of size or type, are a menace to the peace and quiet of our total civilization. This is the violator we are all after.

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*The material is on file at the Office of Noise Abatement.

It worked in the automobile world. I think some of you gentlemen on the panel are probably my age. Some 30 years ago the big deal for any teenager who owned a jalopy was to have straight or blewie pipes. Shortly after the second world war a lot of us made a lot of noise. When it became oppressive, the authorities clamped down and suppressed the practice. We just simply don't have it anymore. Very seldom do we see a noisy hotrodder as we used to see quite frequently.

We feel that same point has been reached by the sport cycles, but we in the industry are not waiting for the authorities to become aroused. We have instigated the noise pollution revolution. It's meeting with great success. Colorado Motorcycle Dealers Association members are resolved to refuse service to any improperly muffled cycles regardless of size or type.

You see, we realize only too well the difficulties involved in enforcing noise level laws and the possibilities of harassment, as well as the likely inequities which are bound to creep up. Therefore, we in the industry are making every effort to clean our own skirts instead of leaving it up to law enforcement to do it for us. Even within our world of cycle racing, mufflers are now required equipment in all but a few very specialized events, such as land speed records at Bonneville Salt Flats, certain national championships and the like.

I would like to reiterate, we in the cycle industry are not just willing to cooperate. We have already, are presently and will in the future instigate legislation seeking effective sound level regulation. We have worked with the Federal Government to establish the existing guidelines and decibel levels, and we specifically support the Federal test procedures. We feel it is technically possible over the ensuing three years to further reduce sound emission of cycles to the point where any cycles produced for highway usage after January 1st, '73, will emit no more than 86 decibels.

For many reasons cycles have become increasingly popular over the years. Those who ride cycles are members of all walks of American life, but most essentially they are taxpayers, and as such should have areas in which to enjoy their sport, but not to the discomfort of their fellow citizens. A cycle, very unlike a tennis racket, can be too noisy. We realize it only too well.

Public authorities are now cooperating in all parts of the country in providing lands for cyclists to enjoy their sport and at a negligible cost to the citizenry. The only prerequisite is that we be reasonable with our noise emission.

We sincerely appreciate this newfound cooperation, and we are dedicated to reaching a desirable level of environmental sound.

We can only hope all other American industries will so dedicate themselves, and that all areas of Government, local, state and national, will find that if it's good for us, it is good for them and will follow suit.

I'd like to thank you all for this opportunity to present a little testimony of what we think, what we believe and what we're doing.

At this time I'd like to present our Vice President, a member of the Board of Directors of the Colorado Motorcycle Dealers Association.

Dr. **MEYER**: At the end of this, after this is all through, we want to have you all together so we can ask you a question or two. The Chair recognizes Mr. Verna.

STATEMENT OF JOHN VERNA, COLORADO MOTORCYCLE DEALERS ASSOC.

Mr. **VERNA**. Thank you, Mr. Chairman. As Mr. Bymaster just mentioned, our Association is very active in initiating and getting through our state legislature Senate Bill 197, but we were also very active in getting Senate Bill 434 through our state legislature. The purpose of this, we felt that less than one percent of the people that are riding sports cycles are causing our problem. Ninety percent of our problem—at least we felt that we had to do something to have some way to control this less than one percent, and we felt that the legislation that we introduced and actively supported in the legislature will do this.

In essence what we're going to try and accomplish or what we will accomplish is to identify all motorcycles, sports cycles, riding in national forest and state public lands. What this bill does is very simply says that you will have to register your sports cycle with the State Game, Fish and Parks Department. There will be or there is now a similar program with the boats. This will enable the enforcement officer on the public lands with high powered binoculars set up on a hill somewhere to actually see the people that are causing us our problems. Then at his leisure he can go out to his house and write a sizable citation. This initially was our purpose in doing this.

We found that we were able through this same vehicle with the registration to require safety standards that are a definite asset as well as the identifying of the violator. It also offers us a way to identify—or at least we hope it will help us find stolen vehicles.

Now, in the State of Colorado if you do not ride on public highways, it's not necessary to register or license a sports cycle. So we feel that by this method some of the stolen vehicles will turn up. A lot of the people that have them, I think, will be innocent people that have bought a motorcycle not knowing it was stolen in California or Oregon or wherever, but we hope that through this we'll be able to lower our insurance rates.

But this law had many side effects that initially we didn't have in mind. What we were trying to do is control the violator, point the finger where it belongs. We also, as I mentioned previously were able to set up safety standards, because at the time these vehicles come in to be registered, they can be looked at and it can be determined if they are safe to operate or not. Also, as was mentioned by Mr. Bymaster, the noise thing can be definitely curtailed, because if they don't pass the safety standard, have a spark arrester, noise control, they just will not be registered and they cannot ride their vehicle.

I have several exhaust systems that I would like for the gentlemen on the panel to look at. The one right there, if you look through it, you can see how much noise and spark arresting they actually do. Not only do we have the problem in the woods of having a noise factor, but we have a fire factor.

Now, those two that you have are absolutely of no value to anything other than to amplify noise. That's all they do. They're called megaphones or amplifiers.

The third one that's coming by is commonly called a snuffer. It's a silencer, which also of no value. You can look straight through, no spark arrester, very little silencing effect, if any.

The fourth one coming down is a silencer and a spark arrester, and if you look through that, you will not see daylight through. That is U. S. Forest Service approved on the spark arrester, and it will suffice most decibel requirements. At least in the State of Colorado now it will suffice our state requirements.

We as an industry have taken the position, as Mr. Bymaster mentioned, that we are not going to make the sports cycle sport available to the violator if we can help it. They're going to have to come to our dealerships for the registration applications.

We have down on the floor in front of you two motorcycles. The brand is not important. They're representative of all motorcycles, and if I may—would you please start the straight legal one for me? Now, remember, we're in a closed building. The engines are cold. It's going to put your decibel meter clear out of sight.

Dr. MEYER: I'm sure it will. I just noticed the reverberation.

Mr. VERNA: Now, this is a straight legal machine that does pass present state noise requirements legislation. It is not at all offensive. It has the required spark arrester for the Forest Service use.

Now we'll show you a competition motorcycle. Thank you. It isn't too difficult for you to see how offensive the second one would be running on a vacant lot, around a corner or up and down your street. That is a competition motorcycle. It is for race tracks and only race tracks. The offender that's riding those through our forests and woods, we're trying to get him out, and we hope that our Senate Bill 434 will help us do this.

At this time I would like to introduce Mr. Bernie Bovee who is the assistant administrator of the park system of the Colorado Game, Fish and Parks Division. Mr. Bovee?

Dr. MEYER: Mr. Bovee, we're pleased to have you here, sir.

STATEMENT OF BERNIE BOVEE, COLORADO GAME, FISH, AND PARKS DIVISION

Mr. BOVEE: Mr. Chairman, members of the panel. You have the booklet before you that will be entered as part of the testimony.

Dr. MEYER: Yes, it will be included with the testimony.

Mr. BOYER: I would like to refer to the first three pages which we have summarized in the front of the booklet. I'd like to summarize for you the recent legislation and regulations that have been developed in the last—mostly in the last six months in the State of Colorado.

The recreation vehicle bill was signed by the Governor as recent as June 2nd of this year. This recreation vehicle legislation provides that registration and regulation will take place on recreation vehicles, and we have defined the recreation vehicles here as those vehicles self-propelled wheeled or track vehicle primarily designed to be operated for recreational purposes on land, or on land and water, other than roads or highway use and for which registration is not required for highway use.

As Mr. Verna has mentioned previously, and Mr. Hein, if a vehicle does not comply with our regulations, a registration can be refused. I might spell out here a little more deeply the safety equipment that is required under our regulations which were just passed this past week by our Game, Fish and Parks Commission. Chapter 13, Number 1302, of our regulation states that ". . . every recreational vehicle operating in this state shall be equipped with a muffler in good working order which conforms to the standards set forth in Chapter 66, Article 35, of the Colorado Revised Statutes," which really applies or refers to the state highway regulation of mufflers for all vehicles in the state; and every recreational vehicle should have a spark arrester, as Mr. Verna has stated. I won't dwell on that. And a protective helmet will also be a part of the safety equipment.

We'll move right on to the second page with the snowmobile which is a real duplication in a sense of the recreational vehicle act. Again, snowmobiles are registered, and mufflers are required to meet standards prescribed by regulation. The snowmobile act also allows communities to pass ordinances and regulations. A penalty as high as a hundred dollars can be effective on either one of the violations of this act.

Safety equipment on the snowmobile again specifies that every snowmobile shall be equipped with a muffler.

I'll pass on to the third page that covers boats which has been in existence for a number of years in Colorado. Legislation requiring the muffling of sounds of the exhaust of all boats operating in the state, and we also have a general regulation on just our own Game, Fish and Parks lands, a general provision again just added to and improved in the past week, that vehicles and operators shall be in compliance with state laws regulating automobiles and other motor vehicles; in other words, not operating on a trail, just operating on a parks road. Vehicles must comply with safety equipment and noise abatement equipment.

I think this prety well sums up our legislation. It's quite voluminous. We won't go into it very deeply. We believe in the multiple use of lands the hiker and the biker and the motorcyclist and the horseman all have to give a little and take a little to make this program work.

Dr. MEYER: It's like a fisherman and the water skier.

*This material is on file at the Office of Noise Abatement and Control.

Mr. Bovee: Yes, sir. We're still facing the fact of one shaking his fist at another. We as a division are very proud of the stand that the motorcycle industry has taken and the cooperation with our division. The snowmobile industry and the motorcycle industry have been very helpful and have worked with our officers in training our officers to recognize the sounds that you heard here and to face the technicalities that will come up in the enforcement of these acts.

Dr. Meyer: Well, thank you very much, sir. I would like if I could to just ask all of the group who were participating in this very, very excellent presentation if you could just come over here together, gentlemen, in case there are some questions. It just seems to me that this is a good example of industry, state government operation.

It seems to me this is a good example of industry and state governmental cooperation that I hope we'll find at the Federal industry level. Certainly in my dealings so far with the Motorcycle Industry Council, we have had very good communications, and hopefully have come to grips with the problem, which by no means is solved all over the country and probably by no means is solved to the satisfaction of other people.

I have a couple of questions I'd like to ask before I ask the panel if they have any. I was rather intrigued with this number of two-wheel vehicles, 110,000. Does anybody know—I can get it if you don't have it—the total number of registered vehicles in the state?

Mr. Verna: The registered vehicles in the state are some 27,000.

Dr. Meyer: Automobiles?

Mr. Verna: Oh, total automobiles?

Dr. Meyer: I can get it if you don't have it.

Mr. Hein: Approximately 1,480,000.

Dr. Meyer: Approximately?

Mr. Hein: It's very close because we do over three million inspections each year, Doctor.

Dr. Meyer: I see. Now, what's the population of Colorado? I'm trying to get a ratio of vehicle population to human population. I can get that from statistical abstracts, though. It is an interesting fact that you have five percent of the total vehicles here.

There was another question I'd like to ask. Your registration provisions—I got the answer to part of it—do apply to the vehicle which normally would not be required to have a state registration, but what about the road vehicle that would normally have to be registered; would he have to have an additional registration?

Mr. Bovee: No, sir.

Dr. Meyer: Not a dual registration?

Mr. Bovee: He can be identified by the tag that he was given by the state.

Dr. Meyer: All right.

Mr. Hein: By the way, Doctor, that includes golf carts, too.

Dr. Meyer: Well, I would think it would. At least the way I read your law there. Let me ask another question. Are these criminal penalties or civil penalties?

Mr. Bovee: These are misdemeanors within the state.

Dr. Meyer: It seems to me, too, that the industry ought to be highly complimented in this state for taking a stand that it's not going to do repair work on a vehicle that's been put in such a condition that it can't be brought up to meet your standards. It would seem to me this also infers you're not going to deliberately alter one for somebody, which to me is a highly commendable thing.

Panel, I'll start on my right. Let's start on the extreme right.

Mr. Norton: The first question I have—I'll just direct it to anyone who cares to answer—what are the standards for noise and how are they measured; that is, what dB(A) level are they measured under, where, how and so forth?

Mr. Verna: Our present state standards are 88 decibels plus or minus two decibels.

Dr. Meyer: Measured on the A scale?

Mr. Verna: Measured on the A scale.

Dr. Meyer: At what distance?

Mr. Verna: At 50 feet with—I don't remember. There's a wind requirement in there also, and buildings have to be so far away. I can't tell you exactly what the requirements are, but wind and buildings—

Dr. Meyer:—Do you know, are these based on the SAE test procedure?

Mr. Verna: Yes, they are.

Dr. Meyer: The Chair and the record know what the SAE test standard is.

Mr. Hein: Dr. Meyer, I just received a letter from John Heckers ,the director of revenue, today, and the new regulations as a result of testimony given on August the 25th are now in effect.

Dr. Meyer: I see.

Mr. Hein: And as soon as we get a copy of that, we'll see that you get it mailed to your Washington office?

Dr. Meyer: In Washington, sir. I seem to be on the road more than I am at home, though.

Mr. Hein: Mr. Verna—I've asked him to show you—you made a comment about altering vehicles.

Dr. Meyer: Yes.

Mr. Hein: We're going to show you how a man may take out the guts of a muffler and the difference it will make. I'd like John to do this.

Dr. Meyer: Even though it's not a good test, could he turn it on and have Mr. Hardesty of my staff measure, a very unprecise and unscientific method, certainly not acceptable in any court of law, before you do that?

Mr. Verna: With and without?

Dr. Meyer: Yes, with and without.

Mr. Verna: I'll have him pull it out as the motor runs. Quite a difference.

Dr. Meyer: There sure is. How many decibels?

Mr. Hardesty: From about 96 to 104.

Dr. Meyer: That's a pretty significant change in acoustical radiated energy, I might point out.

Mr. **NORTON**: May I ask another question related to the first one that I asked? What would this vehicle rate on that standard test procedure? What would the dB(A) rating be on it; would you have any guess?

Mr. **HEIN**: Eighty-six.

Mr. **NORTON**: About 86 under the standard test procedure?

Mr. **VERNA**: It's under the requirements now required. It varies from machine to machine about one decibel, for some reason, 84 to 85, and then we'll get one that runs at 86, but nothing over 86.

Dr. **MEYER**: Any other questions, Mr. Norton?

Mr. **STRUNK**: Yes, I have a question. I'm not clear, is this a special silencer, or is this a production silencer?

Mr. **VERNA**: This one here? The silencer on that particular motorcycle is on all motorcycles, not just on that brand, and as the standard. It's nothing special. It's what the manufacturer sends to us, in this case from Japan. There is no alterations made to it, and I might also add at this time our manufacturers, all manufacturers, are striving to get this decibel rating down even lower, down in the low 80's, but it will probably be another year or—what was it, '73 they're shooting for 83 decibels, stock standard, no alterations made at all.

Dr. **MEYER**: Any other questions? Jim?

Mr. **BOTSFORD**: Yes. We heard Mr. Harris testify this morning that he felt that even these vehicles with standard equipment were still too noisy for the recreational uses they were being put to, and I was wondering—you answered it partly. I was wondering what your comment would be on that and how far you think we have to go to make them really acceptable.

Mr. **BYMASTER**: I think I can answer that very readily. As you noted a moment ago when this gentleman started up this motorcycle, it was rather quiet. Then with a minor wrench or pair of pliers, he pulled the baffles out of the pipe and it became very noisy. I think in the future when you hear any motorcycle built after the 1972 model or later that is making too much noise, it's a case where the individual owner has modified it to make noise. The machines definitely will not under any circumstances emit more than 92 decibels in the future starting in 1972 models. That is our resolution. That is our standard. That is what we are dedicated to, and that is what we are doing.

There will be, as I said, a few exceptions for certain speed records and so on which are completely away from civilization or that will not be adhered to, but for even standard racing of any type, 92 decibels will be the maximum allowed by the motorcycle industry itself. Does that answer your question, sir?

Mr. **BOTSFORD**: Yes.

Dr. **MEYER**: Let me ask you, sir, a question along those lines. Is there any way you can make it more difficult to do that chore than it was just done?

Mr. **BYMASTER**: Yes, it is very likely that it will become quite a bit more difficult. Again, technically at the moment it is not possible. Within the ensuing three years we think it will be. Systems will be welded to the engine in such a way that it will take shop equipment; that is, professional mechanics, to make these alterations in most cases. We're hoping that we can do th where small junior can't go out and offend all of us. Right at the moment we're going to have to put up with the offender. That's the reason for the other rules, the other legislation, we've instigated.

Dr. **Meyer**: Even passing Federal legislation making it a Federal offense with very stiff fines to alter the vehicle, it still leaves us back in the enforcement business in which you have got to catch the offender and prove it. We'd much rather prevent it in the first place.

Mr. **Bymaster**: If we can, we will. We think in the near future we'll be able to do so.

Dr. **Meyer**: On my left?

Dr. **Berry**: I have a question. I gather that you will not work on a bike which has been altered and which makes excessive noise. The question is will you blow the whistle cn him or just refuse to work on it?

Mr. **Verna**: Be happy to. It isn't required of the dirt machine, as we call it, the sports cycle, for them to have a state brake and light sticker, but what we are going to do as quickly as I can find out how to do it, if a person brings his motorcycle in to my store to get an application for a registration and he does not pass these requirements, we are going to mail—this is where my problem is; I don't know what agency yet—this person's name, the serial number of his motorcycle, his address, the whole life history that we can get on this gentleman. Now, I think you might have some little misunderstanding here. We will work on these vehicles providing the customer will allow us to bring them up to safety standards.

Dr. **Meyer**: Yes, I understood that, but you wouldn't just replace it as is.

Mr. **Verna**: No, sir.

Dr. **Meyer**: I understood that was what you were saying.

Any other comments?

Mr. **Norton**: Mr. Chairman, I have one more question. I'd like to direct this to Mr. Bovee. We are finding ourselves in a situation now where certain wilderness areas are being heavily used, overused, by back packers, and agencies are already in the process of instituting control over the number of people who use these areas. In other words, they're limiting the total number of people over periods of time.

Do you foresee in these wilderness areas; that is, areas where vehicle use is not restricted—do you foresee in the future legislation or regulation that will likewise limit the number of people either on foot or in a vehicle in these areas because of the severe impact of the total number of people?

Mr. **Bovee**: Yes, I think that this is very definitely going to take place and is taking place, particularly in the Rocky Mountain National Park. You have to register to go into the park country, and they're allowing so many visitors or so many recreationists into certain areas. We are zoning—the first thing that has hit us in zoning of lakes in Colorado for water skiing and sailing and fishing.

I would like to add to this or make an additional comment that the recent trails legislation—I believe it's House Bill 1144—spells out and recognizes the fact that trails will have to be designated separately in some cases for the hiker, the biker, the motorcyclist and the other vehicle users. It's being recognized; yes, sir, and only time and pressure will create the change.

Mr. NORTON: I guess what I'm referring to is the fact that many of the national forest areas that do not have any particular restrictive classification, such as wilderness or primitive area, if you consider the whole scope of a given unit, let's say, where there are wildlife considerations and so on—I'm not talking just about definite trails or having parallel or multiple trails. I'm talking about the total impact of the total number of people that might be going into this given domain. Do you foresee restricting the number of people going into this area in a given unit of time?

Mr. BOVEE: Yes, sir; I think this would be the carrying capacity of the area and the human beings rather than when we talk about carrying capacity of animal life.

Dr. MEYER: This is something that a lot of people get very concerned about, sir, very concerned.

Mr. BOVEE: A whole broad field of research is required in this area.

Dr. MEYER: Any other questions?

(No response.)

Dr. MEYER: Well, we thank all of you, gentlemen, very, very much.

We have two more witnesses. I found in the past that the people that come on the end generally have something startling to say. I've learned a great deal from each and every witness.

Mrs. McAnally, would you come forward? Very well, ma'am, we're happy to have you here.

STATEMENT OF MRS. W. H. McANALLY

Mrs. McANALLY: Thank you, Mr. Chairman, members of the panel.

I represent a large number of citizens who are not organized, who do not have a lobbyist, and who cannot be here today. Stated simply, we need protection by law from being bombarded and harassed by excessive, unnecessary noise.

Let me make it clear that it is not our desire to put anyone out of business nor to interfere with anyone's enjoyment. But Mr. "Q" Citizen desperately needs help in the matter of noise control.

Is it right that he cannot hear his TV because of a car with an altered or bad muffler or a motorcycle going by on the street? Is it right that he must keep his windows closed at night in order to have his rest undisturbed, or keeping his windows closed during the day to avoid having his children awakened from their nap, by vehicles making excessive noise on the street outside his home?

Is it right that people in the neighborhood should have their nervous system assaulted by the noise from junior's mini-bike or motorcycle as he races up and down the street? I know of a situation where there are 30 mini-bikes in one block radius that are run up and down the street both day and evening, and the people have to keep their windows closed both day and night.

Is it right that people can't enjoy their yards and patios because of the noise level from cars, trucks, motorcycles in their neighborhoods? Is it right that a heart patient—and there are many walking around—is subject to being killed by excessive noise because we have no way of keeping the noise level down? The medical profession tells us that 75 decibels can kill an individual with heart trouble.

Is it right that people's hearing, both drivers and riders of the noisy vehicles, as well as of the general public, should be subject to injury by the uncontrolled noise from the vehicles which could be abated?

You have before you Exhibit A, Noise Sample Survey, made by a qualified noise measurement individual. You will note the maximum noise levels recorded at the various locations. This is proof that a noise abatement law is necessary with law enforcement provisions.

You will notice that in the residential area a car with a bad muffler at 25 feet has an 80 dB(A) rating. A dump truck at 25 feet has a 90 plus rating. Another dump truck at 25 has an 84 rating, and the ambient level is 52.

In a commercial area a fire engine without a siren at 25 feet has a 91 dB(A). A motorcycle has a 92. A car, a VW, with a bad muffler has an 89. A motorcycle at 25 feet has 88. A truck at 25 feet has 88. A VW bus has 87. A telephone truck has 86. A flatbed truck has 86. A motorcycle has 90 plus. The ambient level in that area is 72.

In another commercial area we have the ambient level at 62. We have a truck, unloaded, 85. We have a pickup truck, 85. We have a car with a bad muffler, 86. We have a four-wheel Bronco, gentlemen, at 90. We have a pickup truck at 90. We have a power mower in a residential area at 85.

You have before you Exhibit B, Percentage Risk of Developing a Hearing Handicap from Excessive Noise. This is taken from *Popular Science*, October, 1971, issue. Note the percentage of risk to hearing at 90 dB(A) according to age. Note the risk increases as exposure increases.

I don't think it's necessary for me to read this. I think you can study it at your leisure.

Dr. **MEYER**: We're familiar with it, ma'am.

Mrs. **MCANALLY**: You are familiar with it?

Dr. **MEYER**: Yes, ma'am.

Mrs. **MCANALLY**: All right. Note the article on Exhibit B taken from the same publication: "Noise limits for motorcycles. The motorcycle industry has recently passed a self-imposed noise-limit level. Motorcycles made after Dec. 1 will have a 92 dbA limit. The Motorcycle Industry Council calls it 'a big improvement on current noise levels.' (The International Snowmobile Assn. has adopted an 86-dbA limit on '72 machines, 82 dbA on '73s.)

"It appears to us though, that the noisy critters will have to get even quieter before the public is satisfied."

At this point, may I suggest that if this is 92 dB(A) at 50 feet, add six deb for 25 feet. Also, wouldn't it be great if all motorcycles had the noise limitation of the BMW's manufactured in Germany who have 70 decibels at 25 feet under normal acceleration.

We feel that the majority of people who are responsible for the excessive noise from their vehicles are unaware of the dangers of noise to themselves and to others. They need protection as well as the general public.

Quoting from an article dated September 13, 1971, in the Rocky Mountain News by Ernest B. Ferguson: "Dr. John A. Parr of Great Britain describes physical symptoms as result of excessive noise as follows: 'Our muscles tense and we jerk. Our abdominal blood vessels contract to drive extra blood to the muscles producing a feeling of the stomach turning over. And in an instant the liver releases stores of glucose to provide fuel for the muscles. The internal upheaval is repeated again and again, is exhausting physically and mentally, and ultimately can cause a nervous breakdown.'"

The article continues: "Household noise, neighborhood noise, traffic noise, industrial noise, airport noise, a pre-dawn noise, rush-hour noise—not one of them, but all of them, layered one atop the other are literally driving a certain percentage of Americans mad and having an unmeasured effect on millions of unaware others.

"Yet nothing organized or effective is being done about it. The Department of Labor had the legal authority for 33 years before it acted two years ago, under rising pressure, to set noise levels for industry."

The article speaks about a bill being drafted now to reflect the Administration's desires and the intentions of the Subcommittee, as influenced by hearings of the Senate Commerce Committee's environment Subcommittee, and states: "Even if the Senate bill is rubber stamped into law before the year is out it will provide another two years beyond that before official Federal noise level standards are set, and yet another two years beyond that before manufacturers of noisy machines are required to comply with those standards."

Still quoting from the article: "As currently proposed, the Federal law would have no retroactive effect; that is, the busses, trucks, garbage compressors, air hammers, whisperjets, motorcycles, sirens and other endlessly assorted instruments of the devil already committed to the assualt will be allowed to continue unmuffled until they wear out. The Federal standards envisioned also would preempt what localities could require toward quieter machinery.

"To the surprise of absolutely no one, the long time lag between naming committees, passing laws and perhaps eventually seeing some results in a Governmental courtesy to industry, which will have a hard time converting to make quieter equipment after it is required by law. Of course, no industry is going to do such a thing until it is required by law—not if there is a risk of losing a dollar in the process."

The State of Colorado enacted a Noise Abatement Law in 1971 which sets up reasonable levels in the zoning section of the bill. The portion that refers to the sale of new vehicles manufactured after July 1, 1971 and before January 1, 1973, is of no value to the general public because the noise levels are too high.

Quoting from the zoning portion of the bill, Section 66-35-3, Maximum permissible noise levels: "(1) Every activity to which this article if applicable shall be conducted in a manner so that any noise produced is not objectionable due to intermittance, beat frequency, or shrillness. Sound levels of noise radiating from property line at a distance of 25 feet or more, therefrom, in excess of a dB(A) established for the time period and zones listed in this section shall constitute prima facie evidence that such noise is a public nuisance."

The zones are residential, commercial, light industrial and industrial. The times are from 7:00 a.m. to the next 7:00 p.m. and from 7:00 p.m. to the next 7:00 a.m.

Under residential it's 55 dB(A).

Dr. **MEYER**: We've got this. We can read this, ma'am.

Mrs. **MCANALLY**: You have that?

Dr. **MEYER**: Yes, ma'am.

Mrs. **MCANALLY**: All right.

Dr. **MEYER**: In fact, why don't you take up where it says "However, this law." We can read the whole law portion that you've got here for us.

Mrs. **MCANALLY**: All right. However, this law does not provide for enforcement by law enforcement agencies which puts the burden on the citizen and make it almost useless.

It has come to our attention that it is being proposed to your agency that the noise levels be set at 86 dB(A) at 50 feet. This amounts to approximately 92 dB(A) at 25 feet. The Walsh-Healey Act requires noise levels under 90 in an industrial situation. Therefore, at 86 db(A) at 50 feet would mean the percentage of houses in a community would be subjected to a broad band type of noise at 92 decibels which is higher than an industrial worker is protected from by law.

It is our urgent plea that this agency recommend noise limits at least 80 dB(A) at 25 feet at 25 miles an hour for the protection of the general public who have no one but your agency to protect them in this respect. It is urgently requested that all existing noise-making machines be made to comply. If we have to wait until those are worn out, the law will be practically useless.

It is urgently requested that provision be made for enforcement by law enforcement agencies and not put the burden on the citizen.

It is urgently requested that a law be enacted to become effective within the year and not four or five years hence. Think of the damage that can be done in that time to us all.

It is urgently requested that the law enacted does not preempt or limit the authority of any municipality to adopt standards which are not less restrictive than the provisions of the law.

It is urgently requested that funds be made available where needed, or matched funds policy be set up for enforcement.

What price progress, what price enjoyment, when health and hearing are in jeopardy.

Thank you.

Dr. **MEYER**: Thank you, ma'am. Before asking the panel if there are any questions or comments, let me make a couple of points, first our problem with the devil with the two horns and the cloven hoof who has been pressing very hard with the Congress not to enact legislation which would require regulation standard setting. I testified before Congressman Rogers and Senators Hart and Hatfield that our Agency is determined to take into account technology, needs of the citizens and citizens' views.

Now, we're all aware that in our interest and zeal to do things some rather difficult problems have arisen because of over-hasty action. I'm not going to cite them, but they've been in the press lately. I'm talking about exploring the problem in a methodical straight-forward, precise manner and arriving at results which turn out to be confusing to all concerned, including those who have to administer them.

The two-year time period which is mentioned in the proposed legislation is based on a very careful analysis of just exactly how you could do this job considering the multiplicity of items which must be covered by the standards and considering the need to mobilize people in the country who have the right knowledge—I'm talking about the lawyers and everybody else—to do something else very important which most people forget. To come up with a rule or regulation or proposed standard in a Federal Republic, in a democratic society, you should have maximum opportunity for citizens' comment on those rules and regulations. The fact that we've been able to hold eight hearings at a stupendous cost, I might tell you, around the United States in a nine-month time period ought to give you an example of the grave difficulty of holding proper hearings on proposed rule makings such as you're describing. Two years is a small allotment of time to let people like yourself in Colorado and those in New York and those in Florida and those in Hawaii and those in Louisiana have a say, too. Our desire at this time is to say that there is not a real crisis, but that there is a need to head this off in a anticipitory manner in order to protect your interests and other people's interests.

You heard the other side of the story here in this room today, and I think if we go too fast, we either err on one side or the other, and we are proceeding, we hope, if we get this legislation, with maximum but deliberate speed. So I hope you and your group understand that.

As I said, I don't want to cite two recent very serious problems which have arisen, which would take a little more time. I should like to point out one thing. I don't know who mentioned to you that our Agency was possibly considering setting residential area noise levels at a certain figure. The act that we envision and which, as I've said otherwise today, is the same approach being taken by both parties in both houses of the Congress is not for the setting of standards for residential, commercial or industrial areas, noise requirements will remain with the cities and the states. The Federal Government does not propose to determine what the noise level in downtown Denver should be at 10:00 o'clock at night. We feel that's a responsibility of the State of Colorado and the citizens of Denver. We'll certainly work with them in developing model laws and guidelines based on a vast amount of information which the Federal Government can assemble as a servant of the people. All states can do a better job of assembling the maximum amount of technical data and making it available.

In fact, that's one of the main responsibilities in the law that my Agency, the Environmental Protection Agency, will be involved in. So I would like to set that straight.

I think that one has to realize that there are misunderstandings like this that can creep in, but I want to reassure you we have no intention of proposing some sort of Federal legislation for street corners.

Mrs. McAnally: Do I understand you that you are saying that you will not preempt a municipality from setting more restrictive levels?

Dr. Meyer: What I'm saying, ma'am, is we will set the standard for what noise may be allowed to be emitted by a motorcycle, for example, but we will not state the noise permitted at the edge of a residential district, such as the table that you presented here, in which you note a residential limit of 7:00 a.m. to 7:00 p.m., 55 dB(A). The Federal Government is not going to get into that kind of standard setting. Only with regard to the device itself, the truck, the car or the equipment, and there again, we really don't know what the standards will be because it would be presumptuous of me to indicate what our rules and regulations may be with regard to this when we're not even at the point of beginning to write those standards yet. We're compiling a massive amount of information.

We have just completed a study as part of our report to Congress of all existing and proposed legislative schemes for controlling noise in the United States and also those in some 22 foreign countries. We now have a document about 3 inches thick which is going to serve as the basis for both our standard setting approach and our recommendations to the states and cities.

Again, I point out that this is why you can't rush into these things. It takes months to do this. Hopefully, we're getting the best brains in the country in this field, some of whom are here with us today.

Are there any other comments or questions, panel?

(No response.)

Dr. Meyer: Thank you very much. One of the things that's important in this is to get the view of others, and as a matter of fact, we are trying to accumulate as much information as we can about actual noise conditions. Here again is another piece of information of extreme value in our getting to know what's actually going on. It's very easy to measure New York or some place else, but this kind of information shows more of the attitudes we get, and we will look forward to the time when we hear from you again in regards to such standards.

Mrs. McAnally: Thank you. I try to bring to you the problems that the average citizen has, and he has no recourse. There's no one to whom he can turn. This is hopefully what your Agency may help us with.

Dr. **MEYER**: That's what we're trying to do. That's the purpose of this long day today and having you and all the other folks testify. I do appreciate your participation.

Next we have Mr. Tom Martin and a group of people from Boulder. Are they here, I hope? If so, would you kindly come forward to be the anchor man for this hearing on noise?

Mr. **MARTIN**: Dr. Billings will speak first.

Dr. **MEYER**: All right.

STATEMENT OF DR. DONALD BILLINGS, BOULDER, COLO.

Dr. **BILLINGS**: Thank you, Dr. Meyer. We regret that Dr. Chanaud, who's a nationwide authority on noise, could not be here today because of pressing personal problems.

My statement here will be very brief. The Boulder, Colorado noise control program is a pioneer experiment from which we have derived experience that should be of considerable value in the shaping of a national program since our situation is repeated in towns and cities throughout the United States.

I am speaking as a citizen who has had the longest connection with the Boulder program. During the summer of 1968 I interviewed more than 1,000 Boulder residents concerning their reaction to motor vehicle noise. Later, at the request of the mayor, I served as chairman of a citizens' committee made up of about 20 concerned citizens, motorcycle, sports car and commercial vehicle operators and dealers, to recommend a noise control ordinance to the city.

The present ordinance is largely a result of a one-year effort on the part of this committee. Since its enactment in 1970 I have followed closely the efforts of Boulder's noise control officer in carrying out the ordinance. I have only one point to make. If nationwide noise limits are set, they should be low enough to be effective. Otherwise, they simply legalize an intolerable noise level. If there are obstacles to setting low noise limits, local communities should be given the freedom to decided how much noise they will tolerate.

We have concluded in Boulder that our own limit, 80 decibels on the A scale at 25 feet from the source, is the maximum to which citizens in residential districts should be subjected except in unusual circumstances. We find that something like 199 out of 200 vehicles come within these limits, and that of the violators the overwhelming majority should have come within the limits if they had had their vehicles in proper operating conditions or had operated them in the proper manner. Thank you.

Dr. **MEYER**: Thank you, sir.

Mr. **MARTIN**: I'll speak second, sir.

Dr. **MEYER**: All right, sir.

STATEMENT OF TOM MARTIN, BOULDER, COLO.

Mr. **MARTIN**: Dr. Meyer, gentlemen, I am Tom Martin, Noise Control Officer, City of Boulder, Colorado. Thank you for allowing me to express the City of Boulder's position on pending legislation and on recreational vehicles.

The purpose of the Boulder Noise Ordinance is to create and maintain an ambient noise level so that mental non-repetitive tasks and daily efforts can be maximized as to productivity. Also so that recreational hours can be used to revitalize the body not add to fatigue either mentally or physically. Noise, excess sound, is a health problem not a nuisance and must be controlled the same as any other disease in our society. HEW figures indicate 80 dB(A) on the A scale is that point which creates this health problem. Boulder's program is based on that figure. Twenty percent of the houses are located 25 feet or closer to the streets and this is the distance criteria for enforcement. Relatively expensive equipment with a graph attached has taken the animosity out of the program in addition to a definite distance and noise level established by law. I strongly recommend this type finite criteria be used in any Federal legislation.

The concept of any noise code must be based on health standards not to appease any one given industry or to punitively attack any one industry. Snowmobiles, lawn mowers, motorcycles, et cetera, should be regulated consistent with the overall standard. To discriminate against, or given allowances to any one type of noise source I feel would be inconsistent in improving the overall ambient noise level except where it is absolutely necessary. To be more absolute in this pursuit would be the prohibition of sale of original equipment which produces excess sound and the sale of items which exceed either the noise standard or exceed noise levels of the original equipment.

Eighty dB(A) on the A scale measured from 25 feet has been in effect since February, 1970, in Boulder, Colorado. 1,321 plus vehicles have been repaired or modified to meet the Boulder standard. Minor problems have been encountered.

Of importance is the fact that muffler noise on the two-stroke engine of Japanese design is not the major problem. The problem is acoustical design which could be easily overcome with American acoustical engineering support. May I say that some Japanese motorcycles are acoustical junk and should be banned until corrective action is taken.

Adding to the noise problem is a make of cycles that because of excessive acceleration is a hazard on the streets of Boulder. I predict if the cycle industry does not reverse the trend of speedier acceleration, insurance costs will strangle the industry. I also predict that unless quieter cycles are produced and other methods are found to quiet the older cycles, much of this nation will become off limits to them. I am specifically stating that this noise level must be brought lower than 80 dB(A) at 25 feet in residential areas. This has basically been done in Boulder. To set national standards as proposed during the House Interstate and Foreign Commerce Commission hearing by Mr. Lucia, Motorcycle Industry Council, of 86 dB(A) at 50 feet will eventually destroy the growing and prosperous motorcycle industry.

Another mode of transportation in Boulder that attacks the ambient noise level is the VW and Porsche or sports type cars. The VW produces about five dB(A) more noise than standard American cars. The Porsche about seven. Add an extractor, which is illegal in Colorado, and you assault the ambient noise level.

VW's, Porsches, Triumphs and many other foreign sports cars are acoustical fiascos. Instead of proposing that Boulder raise its noise levels, why not be responsive to the needs of cardiac patients, older people and others sensitive to noise and require dynamic acoustical engineering changes which are presently state of the art to lower the ambient noise level. I wish Dr. Chanaud were here to back that particular statement up.

It would surprise you how quiet things can become once enforcement starts. Industry is amazingly flexible and responsible to legal requirements. Individuals, once educated, are just as responsive. When the Boulder program began, eight motorcycles out of 100 were being stopped. Now one out of a 100 is the average. One automobile out of 166 was initially in violation. Presently it is one out of 301.

Trucks are allowed 88 db(A) at 25 feet in Boulder and do not use residential streets at night. Reicker and Stemco have produced muffling recently which will almost make the Jacobs Brake system quiet enough for Boulder. I do not think muffling will be the problem much longer with trucks. The most significant problem will be the transmission and engine areas. If research monies are appropriated this area should be given adequate attention. Assuming we discount aluminum engines which are acoustical nightmares, the truck will possibly be the first transportation item to see major noise reduction. It is relatively noisy because of lack of acoustical attention. In this area also is a proposal to increase the width of trailers by six inches. Besides increasing the power requirement, this would tend to deteriorate the major highway surfaces even faster than at present and be not only an acoustical mistake but an economic mistake.

Construction noise in most cases has been easily corrected. Most of the excessively noisy equipment was leased. The basic problem was insufficient muffling. Joy Manufacturing and Chicago Pneumatic produce very quiet jackhammers and in a few years with proper Federal legislation this should cease to be a major noise problem. If the construction area continues to be a problem it will be because of lack of proper quantification in Federal and state legislation.

The most immediate and pressing problem is now to save the hearing of our youth because of excessive noise from amplified music.

Basically my age group has made a fortune from selling this acoustical madness to our youth. This is a real and pressing health problem and can no longer be ignored. I suggest Federal legislation be passed that requires every night club or like kind of establishment to maintain a noise level below some dB(A) level. I suggest 90 dB(A) to concur with the Walsh-Healy Act. This demands immediate attention. I also suggest pressure be applied would require sound level equipment but the need is acute and to makers of amplifier, hi-fi and stereo equipment to see if industry can solve the domestic problem. In Boulder it is illegal to practice with amplifiers in the city limits. This type music is confined to a few night clubs. It is not allowed in our parks.

The snowmobile industry has been notified in many ways that it has got to quiet its product. With very little push at the Federal level, I feel this problem will vanish. Basically the snowmobile is either unmuffled or inadequately muffled. This comment also applies to lawn mowers.

There are many social, physical, mental and economic problems associated with noise. Many of these problems have not been finitely answered. A possible solution should be to acoustically map a controlled area and using scientific principles try to answer these fairly difficult questions. In coordination with the University of Colorado, the City of Boulder is submitting a research grant request to try to solve some of these problems not only for our satisfaction but for use by other communities if feasibility can be attained. A gradient noise map would also greatly aid noise enforcement officers by removing the intuitive situation which exists at present. It would also finitely judge the effectiveness of such a noise program.

I do not ; ropose that all municipalities and states adopt the Boulder standard. But it should be allowed because of the feasibility of this standard to establish their won noise limits applicable to each area but far lower than the proposed 86 dB(A) at 50 feet. It is impossible to set equal protection standards because of altitude, wind, humidity, and geographic considerations. Noise attenuation is a variable and not a constant.

Thank you.

Dr. **MEYER**: Mr. Martin, I might infer from looking at this table that a previous witness presented that no automobiles in Lakewood, Colorado are legal in Boulder?

Mr. **MARTIN**: No, not hardly, sir.

Dr. **MEYER**: Well, I read here 84, 91, 92, 89.

Mr. **MARTIN**: You've got to look at the ambient level, sir. Those were exceptions, I'm sure. By the way, in Lakewood there has been no enforcement even with the Colorado State 13-5-105. So it is kind of loud in Lakewood, I'll have to admit.

Dr. **MEYER**: You have a noise ordinance—

Mr. **MARTINS**—The average American automobile is 68 to 72.

Dr. **MEYER**: Yes, sir; but you have a noise ordinance which says it's illegal to drive a vehicle which exceeds 80 dB(A) measured at 25 feet.

Mr. **MARTIN**: That's correct.

Dr. **MEYER**: Now, I didn't hear you say there were some conditions of averaging or anything else. It just says that that's the maximum. That's the top. You can't go any more than that.

Mr. **MARTIN**: We've stopped one out of 30.

Dr. **MEYER**: I see here that a measurement's been made of maximum noise levels in residential areas and commercial levels of vehicles that are operating in that city which are in excess of that, so I would infer if these people drove from Lakewood to Boulder, your policeman would catch him, fine him and tell him to go home?

Mr. **MARTIN**: No, sir; we don't have a program like that. A program of that nature would never work. Our program is based on you fix, we don't fine.

Dr. **MEYER**: Well, I guess what I'm saying, he'd still get stopped. You have some sort of a measuring scheme?

Mr. **MARTIN**: That's correct.

Dr. **MEYER**: Some sort of enforcement program?

Mr. **MARTIN**: That's right.

Dr. **MEYER**: So this individual coming in your own state—I'm not talking about a visitor from New York or California which have higher standards as of the moment—

Mr. **MARTIN**:—Sir, you have to make the decision what these standards are.

Dr. **MEYER**: No, I'm asking a question. I'm trying to find out how you work your law.

Mr. **MARTIN**: We do stop them and they do fix it.

Dr. **MEYER**: Well, suppose they're just passing through; it doesn't affect them then? They've violated your ordinance. If they were from Boulder and going 75 miles an hour in Lakewood and were arrested for it, they'd have to stand some sort of penalty and some sort of notification would be given.

Mr. **MARTIN**: It's the same legal—

Dr. **MEYER**:—That's what I'm asking. Does this have the same legal status?

Mr. **MARTIN**: Yes, sir; it sure does. We do issue warrants when they don't show up and things like this.

Dr. **MEYER**: Now, let me move on to another question before asking the panel if they have some. I noticed you made a comment about a proposed 86 dB(A) unit. I'm at a loss to know where that's coming from. That hasn't been brought up at any of the other hearings. Most people have just said we don't want to see any Federal preemption of the local standards, but I'm sort of confused since our Agency has never once proposed a numerical value for any standard that we're contemplating. In fact, we would be very remiss if we tried to anticipate what those standards would look like.

Mr. **MARTIN**: That was Mr. Lucia's proposal to the Interstate and Foreign Commerce Commission.

Dr. **MEYER**: Well, you're not referring to some proposal of the Environmental Protection Agency?

Mr. **MARTIN**: No, sir.

Dr. **MEYER**: Lastly, sir, I would like to point out one thing, and that is—and I meant to do it earlier—you made references to the Walsh-Healy Act. Again, I would be remiss as a Federal official if I didn't point out that the Walsh-Healy Act is no longer the sole legislation in this area. The Walsh-Healy Act was supplemented by the Occupational Safety and Health Act of 1970 which transferred with it the statement that all the existing regulations issued under the Walsh-Healy Public Contracts Act which applied only to work being done on Federal contracts in excess of a $10,000 would now become applicable to all contracts and all manufacturing establishments in which work in interstate commerce is done.

Mr. **MARTIN**: You will have to excuse my ignorance in that particular terminology.

Dr. **MEYER**: The further thing—and I'm not nit-picking—is that you mention a 90 dB(A). I was just wondering about your rationale since under those Occupation Safety and Health standards the 90 dB(A) implied is for an eight-hour day continuous exposure. I just wondered why you said—let's put it at 90 because most people don't sit in those places for eight hours a day.

Mr. **MARTIN**: Four hours usually.

Dr. **MEYER**: I just wanted your rationale.

Mr. **MARTIN**: It's a suggestion.

Dr. **MEYER**: I would like to get a copy of the law for the record, if I might.

Mr. **MARTIN**: I have a copy here.

Dr. **MEYER**: Are there any questions before the next witness?

Mr. **STRUNK**: Mr. Martin, you indicated that if you stopped a violator, then they have to fix it. By fixing it what do they have to do?

Mr. **MARTIN**: With the majority of vehicles, it's a very, very minor problem. It's either a broken muffler or an improper muffler, glass packs. They have to put on the original type equipment, the original thrust pack. The gentlemen who have already spoken and you know what those are. It's very easy. You go down and replace it with an adequate muffler. The motorcycle shops in Boulder have been very helpful. We have kind of organized together, and we're kind of winning the battle here because we don't issue such stickers without a proper muffler, but it's a simple thing. It's nothing difficult.

Mr. **STRUNK**: I think this is a point that I would like to mention. There's been an awful lot of talk today about exhaust noise and the feeling that once we put a silencer on the exhaust, everything is fixed. That is not necessarily the case. There are many other sources which will make it very difficult to reach limits. An automobile such as the VW and the Porsche do not have an exhaust noise, but they have mechanical noise which comes through.

Dr. **MEYER**: Thank you, Mr. Strunk. That was an important point which I'm glad you interjected, because you have tire noise, and on air cooled engines you've got gear noise and a whole flock of things which I think some people have to recognize. We're not solving noise by mufflers, which, unfortunately, does happen to be a trap some of us have fallen into.

Thank you very much. I understand you have one more witness with you.

Mr. **MARTIN**: I believe we have two more.

Mr. **BOTSFORD**: Your ordinance is essentially an ordinance that requires responsible operation of the vehicle; it's not a maximum noise test?

Mr. **MARTIN**: That's correct.

Mr. **BOTSFORD**: Like the motorcycle. When they're talking about 92 dB(A) or 86 dB(A), that could be entirely consistent with operation on your streets?

Mr. **MARTIN**: Yes, sir. You can take an unmuffled motorcycle, just about any of them made, and you can go through the City of Boulder without violating the city noise ordinance, but we do have another law, 207, that if you have unmuffled—this comes off the state code, by the way, just incorporated in our city—if you have changed that muffler and it's noticeable, you can also be stopped for 20-7. So we actually have got them both ways.

Dr. **MEYER**: I'm glad you brought that up. You've just brought up one of the fundamental things that are plaguing all of us, and that is a translation of test procedures in enforcement. We talk about a test procedure that says so much noise at so many feet, and I keep saying that's fine, that may be the standard, but when it comes down to use restrictions, which is what you're talking about—you just admitted that even though he passed over his 86 dB(A) that he's proposed, his vehicle could still operate in your city and stay within your law.

Mr. **MARTIN**: There's going to be some terrific education to all these drivers.

Dr. **MEYER**: The point I'm trying to drive home is that this is why we're saying we got to go at this in a scientific manner. In fact, California and some of the other states are really getting very concerned now about their law being picked up and used in different ways than it was meant to be. I don't need to say any more on that. This is something we're trying to come up with, a way of translating all these different things in meaningful and understandable words.

Mr. **MARTIN**: Well, if I may—

Dr. **MEYER**:—Yes, sir.

Mr. **MARTIN**:—I think the California standards, if you look at them and the percentage of stops that they make per car, you'll see that they're a little bit high. Their test procedures may be or may not be applicable. I just don't have that type of knowledge.

Dr. **MEYER**: That's the point exactly. Very well. We'd like to hear your last witness here so we can recess until tomorrow morning.

Mr. **MARTIN**: Mr. Steve Butler, sir, a CU student.

Dr. **MEYER**: Very good.

STATEMENT OF STEVE BUTLER

Mr. **BUTLER**: I'm here in just sort of a peripheral way in the fact that I'v been doing some research in alternative power plants. However, there is a function of noise which I'd like to speak a little bit about, and that is relative to the possibility—and this is certainly what it is at this moment, a possibility—of alternative power plants being applied to recreational vehicles and agricultural vehicles.

Now, at present we're working both on steam and electric in Boulder, and from the tests that we have run on our vehicles and on similar vehicles that are now being developed in California, we find that the steam system in particular can meet the performance criteria as well as the—or be able to exceed the noise criteria that is now accepted for vehicles by a factor of 20 or 30 percent, possibly more. So in that respect I have a question more than anything of this group, I think, and that is what provisions may be allowed for in the bill or any impending legislation that may allow for significant changes in technology relative to noise, and would these changes be of a nature that they would override other economic factors as we saw in the air pollution legislation in the Clean Air Act, that the costs to the consumer may, in fact, be four or five hundred dollars greater than it is now to meet the '75 or '76 standards, and my question really then is how far or how much enforcement, how quiet do we want vehicles, and in that respect what kinds of provisions are now or intended to be included in the bill?

Dr. **MEYER**: Well, I may answer that since the other gentlemen here are serving with me as technical experts and not Government bureaucrats.

First, there is a provision in the bill for some special technical assistance in research relating to development of better means of controlling noise, and we envision both in the administration's bill and in the Congress' proposals, a broad gauge effort in this area. So we would, of course, be interested in what people are doing.

Now, a scheme of action with regard to standards says that once we have identified the source of noise considered to be a hazard to health and welfare, then the administrator must issue some standards about it, and he must come back and look at these standards from time to time on a basis of available technology in order to revise them. Now, when you come to the question of what's the price you're willing to pay, you've already mentioned the hypothesis, well, maybe air pollution control is going to cost $500.00 a car. Nobody really knows if it's going to be 550 dollars or five dollars at this point. As we get closer to this, we'll know, but the point I have to bring up with you—it's been rather emphatically brought home to us by members of Congress—is that we can't add, say, $500.00 for this thing and another 750 dollars for this and another 550 dollars for this for a product whose basic cost is on the order of $3,000.00. If we do that, then indeed we've got to look for some alternatives to get this price down.

So I'm not trying to escape your question. I'm trying to say that there are going to have to be some very real proofs on both sides. One side is what's the real damage in terms of insults to environmental quality by noise. One must keep in mind the levels that we start talking are about 50, 55, dB(A). You're talking about primarily interference with communication, interference with the desired avocation, interference with sleep, which is an important consideration.

You're not talking about, frankly, demonstrable gross phsiological insult, and so when you get down to that area, you're going to have to do some very careful cost effective studies and benefit studies which again our Agency is in the process of initiating right now. We need to know a great deal more on that side of the equation of what the effects really mean.

I don't think I'm prepared today, or is anybody whom I know to be a realist, ready to say what that price is, but it's one we've got a means of determining. This is one of the things that this Agency has got to do to serve the people.

Would you like to make a comment?

(No response.)

Ladies and gentlemen, I appreciate your patience. These are long sessions, but they're important to the Government which means they're important to you. With that comment I will recess this hearing until 9:00 o'clock in the morning.

(Whereupon, a 6:45 o'clock p.m., the hearing was recessed to reconvene at 9:00 o'clock a.m. on Friday, October 1, 1971.)

ENVIRONMENTAL PROTECTION AGENCY

PUBLIC HEARINGS ON AGRICULTURAL AND RECREATIONAL USE NOISE

FRIDAY, OCT. 1, 1971

The hearing was convened at 9:15 a.m., pursuant to recess, Dr. Alvin F. Meyer Jr., Director, Office of Noise Abatement and Control, Environmental Protection Agency, presiding as Chairman.

PANEL:

Dr. Clyde Berry, University of Iowa
James Botsford, Bethlehem Steel Corp.
Dr. John Fletcher, Memphis State University
Boyd Norton, Friends of the Earth
Richard Strunk, Bolt, Beranek & Newman

PROCEEDINGS

Dr. **MEYER**: I hereby call to order the October 1st session of the Environmental Protection Agency hearings on noise for the Administrator, Mr. William D. Ruckleshaus. This hearing is being held under authority of Title IV, Public Law 91-604. Many of you were here yesterday, but I still should, for the record, make several introductory comments and before doing so let me again introduce the distinguished group of panelists who are assisting me in receiving from the witnesses and participants in this hearing, information relating to the noise problem.

I am assisted by Dr. Clyde Berry of the University of Iowa; James Botsford, Bethlehem Steel Corporation, Bethlehem, Pennsylvania; Dr. John Fletcher, Memphis State University; Mr. Boyd Norton, Friends of the Earth, Denver, Colorado; and Mr. Richard Strunk, of Bolt, Beranek and Newman.

Now again, let me reiterate the rules under which we operate these hearings. They are in general the same rules as those of the House Committee on Government Operations of the House of Representatives, when it is conducting a federal off-site hearing.

Under those procedures we receive testimony from witnesses whom we have requested to provide us with copies of their prepared statements. The witness may either summarize his statement or he may read it. No questions are permitted directly from the floor either to the panel or to the witness. But if a question does arise that you feel should be considered, it may be written and handed to one of our staff personnel who will in turn give it to me. If I am satisfied that it is appropriate as a matter of general interest, I will either address it to the witness or to one of the panelists or respond to it myself. Or if it is a matter of very narrow interest, I will arrange for either a panelist and the witness or myself to get together with the person.

Again, let me summarize the purpose of these hearings. These hearings are not adversary proceedings at all nor are they for the purpose of establishing regulations, rather they are intended to obtain information which will be useful to the Environmental Protection Agency in submitting a report to the Congress called for in the aforementioned Act. In addition, they will also serve as a very valuable source of information for the future program activities of the Environmental Protection Agency in relation to control of noise as a problem affecting environmental quality.

Also, I should like to remind the group that the record of this hearing stays open for approximately 2 weeks during which time we may receive additional written communications relating to the hearing and to the subject matter. Someone may wish to make a formal statement or a submission and we will receive it for 2 weeks. At that time then the hearing transcript is submitted to the Government Printing Office and will become available to the public through the Government Printing Office in approximately 6 more weeks or about 2 months from now. So this entire proceeding becomes a matter of public record, as well as being available to the members of Congress who will receive copies.

This morning we are devoting ourselves primarily to statements and information from various segments of industry and professions and institutions concerned with the noise problem, and so, without further ado I will invite Mr. Cecil R. Sparks of the Southwest Research Institute of San Antonio, Texas to come forward. Good morning, Mr. Sparks.

STATEMENT OF CECIL SPARKS, SOUTHWEST RESEARCH INSTITUTE

Mr. SPARKS: Thank you, sir. I would like to address my comments this morning principally to the problem or question of hearing loss in the operators of farm and construction-type equipment tractors and these sorts of things and perhaps lay a little of the background of the work that has been done by this industry in these and some of the other problem areas of equipment noise, both environmental and control.

The problem of noise is not a new one in agricultural equipment circles. Nor to many of the other areas or industries associated with engine-powered equipment. Whereas some segments of industry may have come to a rather rude awakening with the sudden increase in interest in noise this, in fact, is an area where the manufacturers of much of the agricultural and construction equipment, an area where they have been concerned for some years. Interest in the problem began, of course, within individual member companies and within the last decade has been rather strongly centered in some of the professional and some of the industrial organizations which bring these industries together into organizations such as SAE, FIEI, and so forth. It is, in fact, from one such program conducted at the SWRI, that is Southwest for the Society of Automotive Engineers and sponsored, in fact, by several of the trade associations that most of my discussion today will be drawn from.

Most of the noise work by individual companies within the agricultural and engine-powered industry has involved engineering studies concerned with analyzing and controlling specific engineering problems of noise with regard to specific pieces of equipment. The state of the art of noise control is such that almost any piece of equipment can be brought down to any level desired if all you are being concerned with is noise. However, a chain saw which cannot be lifted conveniently or is too large to be maneuvered around doesn't make much sense. Economic effects also come into play when significant control is required, as noise treatments almost inevitably increase equipment manufacturing costs—often to a degree which discourages acceptance by the public. Something as obvious as a cab on a tractor may (if properly designed) provide significant hearing protection for the driver, but he may suffer from heat prostration, for example, down in my part of the country unless an air-conditioning unit isn't added to this. So the problem isn't as simple as outlawing noisy equipment; some cognizance must be given to the economic plight of the farmer and especially the small farmer, who is already having a tough time making ends meet—as well as to the economic impact of overly restrictive legislation on the equipment manufacturer.

Some of these points were discussed in yesterday's testimony by the gentleman from the Colorado Farm Bureau. Hopefully, the noise problem can be solved through application of other (perhaps less obvious and less costly) approaches in basic design of equipment, but in any case, some time will be required to evolve and implement such approaches.

One of the major problems encountered in noise research within the industry has been the lack of well organized criteria as to what constitutes acceptable noise conditions (level, spectra) either for hearing protection for the operator or prevention of annoyance within adjacent communities. There has been some evidence to support the contention that prolonged operation of agricultural tractors can accelerate hearing loss, but there is no clear-cut correlation between exposure pattern, noise characteristics, and hearing loss. Some of the common problems such as variations in individual susceptibility, obtaining accurate past exposure patterns, intermittency factors, etc., have been hashed over for years in our concern for industrial hearing loss, and I won't dwell upon them here. Unfortunately, the noise guidelines set under the Occupational Safety and Health Act, while presumably adequate for most industries, prove of little value in assessing the potential risk of hearing loss for the operator of agricultural equipment.

The dBA guidelines given in OSHA are, of course, based on criteria evolved for 8-hour per day exposures, 5-days per week lifetime exposure to continuous, broad band, constant amplitude noise, with 5 dB increases allowed per halving of exposure time as the intermittency factor. In view of the elastic differences in exposure patterns of tractor operators (either farm or construction equipment), the applicability of this act is of course suspect, as is the applicability of most other known criterion. Typically, operators of such equipment are exposed to intermittent variable intensity noise. The various operating configurations for agricultural equipment produce different noise levels and spectra, and further, the related noise exposure patterns can involve quite different recovery or rest periods. We are talking about operating a variety of different types of equipment. We are talking about using the same equipment for particular loads. The operation of a backhoe, for example, the operation of a large earth mover where you perhaps run through, make a scrape or an excavation, you transport, you dump, you make another transport back to the site and start the cycle over again.

It isn't a continuous noise spectra or noise exposure or noise dosage in many many cases. Further, operation is typically seasonal, and during heavy operation, the exposure may be 12 to 16 hours per day, 7 days per week. In farm usage, exposure periods may be followed by several months of inactivity or very light exposure. In addition, noise conditions during the tillage season may be different from that of the harvest season, due to differences arising from the equipment used in each operation. In addition, it would be fairly easy to document that the operator exposure patterns vary elastically with geographical, or more precisely, agricultural regions which we will deal with a little more in just a moment.

In recognition of these problems, the industry, and particular a group of agricultural and construction equipment manufacturing associations plus the Department of Transportation sponsored at SWRI the Society of Automotive Engineers, R-4 research program, which was mentioned yesterday. A study to assess the state of the art of hearing damage risk criteria with regard to their applicability to operators of farm and construction equipment, to collect and assimilate data regarding operator exposure patterns and intensities and these sorts of things and to recommend approaches through which more effective noise exposure criteria might be evolved.

The results of this study are given in a report entitled "A Study of Noise Induced Hearing Damage Risk for Operators of Farm and Construction Equipment." SAE Technical Report, R-4, dated December 1969. A copy of this report is appended to the original copy of this presentation and provides considerably more detail than we could hope to go into and I left this out at the front—

Dr. **Meyer**: A copy of it will be included after this presentation in the transcript. We can reduce it down to size to include it with the transcript.

Mr. **Sparks**: Thank you. From the onset of the SAE program, it became obvious that the seasonal fluctuations experienced by farm equipment operators made any generalization of typical noise exposure patterns almost meaningless. The first few illustrations are presented to demonstrate this variability.

The first slide, these are appended to the written text, by the way, reverse forward. There we go. The first slide illustrates the monthly variations in tractor operations of a typical small grain farmer. This shows the hours accumulated versus the calendar months, the seasonal variations, if you will, of operation. The preparation of land in April and May and the harvesting in October represents the largest portion of the noise dosage. This data represents an assimilation of data and comments from several farm equipment manufacturers and was originally based on a yearly exposure of about 800 hours. It turns out through work since this program terminated, work within the industry chiefly that this is slightly overly optimistic or a slightly high estimate of typical usage with a more realistic figure being 5 to 600 per year of this type of tractor.

In addition to the seasonal variations in noise dosage, there also appears to be a definite geographical variation in farm noise dosage. Of course, this variation is based more on types of crop, but it does allow for the definition of four major geographical areas and several such minor areas. The four predominant areas are the Plains States, Rocky Mountain States, Corn Belt States, Cotton Belt or Southern States.

The next slide—whoops—wrong way, excuse me, presents the variations in average hours of tractor operation per month in the 4 areas. This is for the 90-100 horsepower tractor class by the way. It is important to note that the types and sizes of equipment used are fairly unique for each area with a small grain farm of the plain states we find very often the largest equipment. This then, is the estimated hours—average hours of use in each of the individual months. This again, like the previous slide, illustrates the wide variations in usage from month to month, but also the variations in usage from geographical area to geographical area and for the same basic size of tractor, which complicates the problem, of course, of trying to set criteria for a given tractor configuration.

In addition to the geographical and seasonal fluctuations, the farmer then also experiences wide fluctuations in noise dose resulting from the myriad of chores that must be performed.

In the 3rd slide then, we show an average percent distribution of total hours of operation for 40 horsepower tractors. This data was taken from an article by Ricketts and Weber for several tractors of the 40 horsepower class. This then, is a typical—we can't say necessarily that it is average because of sample size and so forth, but shows some of the things in which these operators are involved.

The final slide demonstrates the extreme variations in noise dosage under two typical tractor operating conditions and this figure, two histograms, represents the time-exposure level patterns for an operator using the same tractor for mowing cornstalks in the light blue area and for hauling grain in the pink area. So again, the same tractor, but with different appendages or attachments to it and different functions. The variations here, we plot total operating time as the ordinant and dosage in dBA as the abscissa. Here you can see the variation is so severe that the two functions, the two histograms do not even overlap. This figure not only illustrates the wide variations in dose but also points up another facet of the problem that simple measurement of tractor noise made with the tractor alone does not necessarily provide valid data for computing noise dosage and in particular, of course, or especially, when made under laboratory or non-typical usage conditions again these illustrations point to one of the greatest obstacles in assessing the risk of hearing loss for operators of farm equipment.

The wide variations in the day-to-day and month-to-month noise dosages make the use of such noise criteria as that contained in OSHA of very little value from a, really from a technical standpoint. There is very little basis from which to pick a typical day (or perhaps a more meaningful worse typical day) which you could use to assess the typical exposure or the exposure patterns which you were to adopt as your standards.

The evaluation of exposure to intermittent variable noise is one of the most difficult areas in hearing loss protection, and while OSHA is a step in the right direction for daily fluctuations, in its current format it is not intended to handle variations in excess of a day. The Equivalent Continuous Sound Pressure Level Method presented by the ISO and discussed briefly in the SAE R-4 report is designed to handle variations of up to a week. It can handle longer variations but requires, of course, rather detailed measurements.

Again, however, no proof exists that, or no documentation exists that this kind of approach works for arbitrary exposure patterns or more likely, for arbitrary rest or recovery periods.

Realizing the lack of realistic guidelines or criteria, and the lack of any firm statistical definition of typical noise exposure patterns, the agricultural industry has experienced difficulty in setting realistic goals for a noise reduction program. Why force a farmer to pay for something which produces a noise level of less than 90 dBA or even 85 or 80 dBA if a 95 dBA tractor does not contribute to measurable life time hearing loss because of use pattern and these sorts of things. From some data it appears that an increase in 6 dB in the maximum allowable noise level should be permitted under the equal energy principle for an operator who uses his equipment only 500 hours per year which isn't out of the ball park. Many people experience a hearing loss, farm equipment is too noisy, while this may be a correct assumption, documentation is not now available that correlates this hearing loss to farm equipment.

This is another area which needs further work. The conclusions drawn in the R-4 report was several. Briefly stated or briefly, they stated that insufficient documentation exists to establish a relation between agriculture equipment noise exposure and hearing losses occurring in operators of this equipment. The report does not deny that hearing loss might exist, but emphasizes that more effective criteria are needed if a realistic approach is to be taken in controlling agricultural equipment noise. We are not suggesting, of course, that noise control work should wait until perfect criteria are available. This is nonsense of course, but we have really a rather poor basis for legislating restrictive levels from, well, take an example of industrial noise and applying it directly without question to the agricultural industry.

Secondly, because criteria are not now available by which we can judge the risk of hearing loss from farm noise exposures, the industry should begin to assimilate data on noise exposures. The exposure patterns of the users of their equipment. An effort should be aimed at collecting two types of data. Typical exposure data, time of exposure and level duration and level, which we call in the report, dosage and the incidence of hearing loss among operators of farm and construction equipment. The correlation of these two pieces of data could provide a reasonably accurate criteria for the prevention of hearing loss in the future.

Since publishing the R-4 report, the agricultural industry, and in particular, the equipment manufacturers, have been working to collect data on farm equipment usage patterns, to develop standard noise labeling methods, and noise dosage measurement methods. This effort will most certainly lead to the collection of a large amount of the data required in establishing guidelines for the protection of operator hearing levels.

Several areas remain, however, where the nature and scope of the problem indicates a significant potential for group sponsored or perhaps government sponsored activity in some of these areas. It is therefore our recommendation that the EPA consider activities in the following areas.

A comprehensive program to determine the incidence of measurable hearing loss among the operators of farm or agricultural equipment. This work should place special emphasis on the separation of the data by geographical areas as outlined earlier.

No. 2, a program to increase the research effort in the correlation of hearing damage risk with exposure to intermittent variable intensity noise. Because this type of noise exposure is common in almost every industrial noise exposure problem, the development of a strong correlation would solve a large portion of the noise dosage analysis problem in many industries. Plant operators, these sort of things. We see a variety of industrial areas in our work and plant noise control, where the same limitations appear. Plant operators who do maintenance sometimes, who do something else, but sit in the control office a good portion of the time.

Finally, work oriented to the development of a technique similar, or, not necessarily even of the same format, but similar to that contained in the Equivalent Continuous Sound Pressure Level Method of ISO, whereby the intermittent variable noise dosages of any arbitrary time increment might be automatically converted to a single value equivalent continuous noise level in dBA for the measured time. Something that will define the maximum allowable dose, if you will, and this may be in the form of a dosimeter or whatever, thank you sir.

Dr. **MEYER**: Thank you Mr. Sparks. It occurs to me that you have highlighted much larger problems which are concerned with how to establish criteria. You point out the need for to recognize the effect of noise on individuals. A lot of the discussion yesterday about standards certainly focused on that. We really don't know how much exposure to noise the average citizen has. As I listened to this paper the thought occurred to me this is one of the things we have really got to follow up on.

Mr. **Sparks**: That's correct and there is a definite danger, of course, of trying to select or usurp a criteria from one area of exposure, from one area of industry and just assuming without detailed consideration that this fits in other types of exposure.

Dr. **Meyer**: Fine, I will ask the panel on the left.

Dr. **Berry**: I think that I would like to have your reaction to the age differential that occurs between your OSHA noise limitations and the disparity in age that will be incurred in farm operations, the very young boys on farm tractors. There will be women on farm tractors, there will be grandpa on farm tractors. Would you have any thoughts as to the distinction that would be made between the disparity of this age group and the age group between 20 and 65, predominantly male that you find in a factory setting.

Mr. **Sparks**: It would be very, very difficult, of course, to generalize and categorize the users of this equipment with regard to age. I think methods like the ISO method provides a risk table which gives risk as a function of age and so in this way it can be related to, directly to age characteristics. This particular criteria.

Dr. **Fletcher**: Mr. Sparks, I'm very pleased to see that people are indeed looking into farm equipment. I think that the most conservative assumption we can go on and probably it is a fairly good one is that there is some correlation between the exposure of the farmer and his hearing and the noise levels of his environment. Correlation, as we all know very well, you can prove almost anything you want with correlation.

Mr. **Sparks**: I meant to say defined correlation.

Dr. **Fletcher**: There are several problems here which I think we should make a little more explicit. First of all, the data on the damage risk criteria are pretty well dependent upon 8-hour days, 5 days a week and so on and definitely the farmer is in violation of these criteria to begin with, which makes them suspect. But, we do know from very recent work that longer exposure to lower levels can result in measurable changes in hearing and we further know that these changes in hearing are temporary, if you will. That this TTS recovers much more slowly than the same amount of TTS, which would be induced over a much shorter period of time. The difference, a chronic, and an acute exposure and knowing this then, with the farmer working, perhaps, 16 or 18 hours a day and knowing that the TTS that he had has been accumulated very slowly and knowing that it rocovers slowly, I can tell you some of it is not recovered in three days. And further knowing that when he is re-exposed with some residual temporary loss from the previous exposure, he is more likely to suffer permanent hearing loss. Knowing all of that, I think that some of your conclusions are much better verified now. We'd better look into this.

Mr. **Sparks**: You are saying if he gets to complete recovery, his possibility for TTS will be less? Yes, we did analyze some of the data. We took the TTS method and took a typical exposure pattern and ran through this kind of thing and came up with, using the Keeler method from 18 to 25 dBA for farmers who would be exposed to this. Taking the data that we could get from the field though most grossly approximating this, we came up with a measurable hearing loss of only about 10 to 12 dB. So this, although very, very qualitative or very approximate, bears out further what you said, which just again points up that a good deal of work needs to be done if you are trying to get a quantitative correlation between all these factors.

Dr. **FLETCHER**: All of the exposure data that you showed very clearly on your slides, taken into consideration with the facts I have just discussed, make it look like the farmers lot is, as in Gilbert and Sullivan, is indeed an unhappy one as far as the prognosis for hearing and I think we should be very careful in looking at this to arrive at the proper conclusions and certainly work remains to be done. We haven't worked ourselves on the job.

Dr. **MEYER**: That's right.

Mr. **BOTSFORD**: You caught me at a bad time, you caught me drinking—

Dr. **MEYER**: I didn't do it deliberately.

Mr. **BOTSFORD**: Water. I have some comments I would like to make on this subject. I didn't know we were going to be concerned with hearing damage in these hearings but the Chairman tells me that it is quite proper. The damage risk criteria that you mentioned and that are in use in industry today are intended to prevent hearing impairments as defined by the medical profession. Now the medical profession does not feel that there is any handicap until hearing damage is sufficient to interfere with everyday speech under everyday conditions.

In other words, their method of calculating percentage of hearing loss based on handicap contemplates the employer-employee relationship where both derive collective benefits. That is the employee gets wages which may be elevated somewhat due to severe working conditions, such as noise or heat or other things, exposure to weather, for example. Now as I mentioned initially, these criteria are intended to prevent hearing handicap as defined by the medical profession and contemplates the employer-employee relationship.

Now, when we come into the public sector with an individual who owns a piece of equipment, there is no economic relationship, there is no employer-employee relationship and I am wondering if the same standards ought to be applied. I personally do think they should. I think the objective there should be not just to minimize hearing loss to the point where there is no interference with the ability to talk to each other, but I think probably more importantly there should not be any change in hearing whatsoever that's related to the exposure.

Dr. **MEYER**: Go ahead, I thought you were through. I am endorsing everything you are saying, I want you to continue.

Mr. **BOTSFORD**: Another reason for saying this is the individual does not have a medical-legal remedy, the way the employee does through the Workman's Compensation laws of the state and only has the possibility of product liability action against the manufacturer of a piece of equipment that is injured. So I suggest to you that, Mr. Sparks, that perhaps different criteria ought to be considered in this connection. Dr. Cohen of the U. S. Public Health Service has recommended on the basis of these considerations that noise levels, where the public is concerned, ought to be at least 10 decibels below those that are applied in the industrial situation.

Now, with regard to the fact that, or the point that you made that the employers should not be, or the farmers should not be burdened with the cost of noise control for equipment which may not be injurious to his hearing because of the use pattern, I would like to suggest that a lot of this farm machinery does not go to farms. I see stuff around my town that looked like farm tractors to me that are used by contractors with a bucket on the front to dig with or a backhoe and the golf courses are mowed with farm-type tractors so I think that we can't really, the manufacturers cannot know from the onset whether this thing is going to a farm or whether it is going to some place even in industry where it can get hard use.

Now, on the matter of the criteria which are applied in industry, as Dr. Fletcher mentioned, these are based on the idea that you do not exceed the exposures allowed by the criteria. Then there will be complete recovery from temporary hearing loss before the next exposure comes on. I think maybe that would be a good criteria for you to use, say with any kind of machinery that gets intermittent use, because we have to almost take this position in industry, since with rotation of personnel and trying to keep them in the proper job, according to seniority and moving people around, we can get to intermittent exposure even though the noise at this location may be the same every day, there is a different man doing it.

Mr. Sparks: That's right. The TTS-2 and D. W. Robinson work, both have some potential we feel in these areas.

Mr. Botsford: Just one final point on the noise hazard. As Dr. Webber testified yesterday, he saw evidence of this in school children. I would like to remind you that in 1954 and 1955, hearing surveys were done at the Wisconsin State Fair by Dr. Glorig and they too found that farmers or farm workers had more hearing loss than the general population, but less than industrial workers.

Mr. Sparks: In school children?

Mr. Botsford: These people came to the Wisconsin State Fair and got their hearing tested and one of the ways the data was analyzed was to test the general population and then farm workers and industrial workers and hearing impairments or hearing loss elevated in that order, according to their findings.

Dr. Meyer: I want to thank you Dr. Fletcher and Mr. Botsford for bringing these points out. I would like to say at this point, before asking the other panelists on the right if they have any comments or questions, that one of the purposes of hearings like this is getting as much information as possible into the record, particularly where there are among both the professions and the private sector and industry, valid differences in viewpoints.

I think it is very important that these things be brought forth and I hope no witness will take umbrage that somebody on the panel addresses himself rather lengthily to a point that they are making, because often they are saying that should be brought out. Yesterday I spoke a little long with Miss McAnally, a witness, about why the Administration had taken the view it had about timing on setting standards. It wasn't because I was critical of her statement, it was because I wanted the record to contain the other side of the coin.

What we are trying to do in these hearings is to avoid creating "truths by assertion" which are actually misrepresentations or distortions of fact which are re-enforced by the presentation of only one side of a problem. What we are trying to do in the record is to present both sides so you will get a picture of the actual situation as presented at these hearings. Any comments, Mr. Strunk?

Mr. STRUNK: Mr. Sparks, you indicated that the noise environment of the farm tractor operator could be solved by putting him in a cab, but that in most sections of the country it would be necessary to air-condition this cab, but that this puts an undue economic disadvantage on the farmer. I wonder if you could give us the percentage of increase in the original cost of the equipment in the acquisition of an air-conditioned cab and indicate what the increase in operating costs would be?

Mr. SPARKS: I said there is that possibility that needs to be considered. I have heard cab price figures. I couldn't document them. I couldn't say what size vehicle we were talking about, so I'd really probably better not try to answer that. There were figures yesterday, for example, quoted from a thousand to $1,500 for a cab on a tractor. I don't know if that figure includes air-conditioning or not.

Mr. STRUNK: Thank you, maybe that can be brought out later.

Mr. NORTON: I am intrigued by one of your last comments, particularly one which I think alludes to the possible need for developing an integrating dosimeter. Perhaps akin to the type that was used in uranium work. Is such a thing under development, or do you know?

Mr. SPARKS: There are several commercially available, yes.

Mr. NORTON: That are available now? What form do these instruments take, are they something fairly large? Again, I am thinking back to my days in the nuclear field, where we used little pencil-type dosimeters to read—

Mr. SPARKS: So far as I know, there is nothing that small. There are a variety of them available. Many of which you hang on the wall, which accumulates the dosage in an area, rather than on a person. I don't know if there exists one now that you can wear in your pocket or not. I believe there is.

Dr. MEYER: I know there are several under development. This is interestingly enough a long standing area of investigation dating back to the 1950's in the military and of course again, the problem is what's the unit—what are you trying to measure? Is it acoustical energy received? It is a very difficult problem to solve.

Mr. NORTON: What are the criteria you build into that instrument?

Mr. SPARKS: It is not quite as easy as a pencil dosimeter. You get back the problem you have with those, what you are really translating is the measurement of ionization—Walsh-Healey had something we could build and sell it and we anticipated that other people would have the same idea, so we let it go. The criteria were to find so you could build something for that, if its applicability is in question. There are other types of dosimeters, the problem isn't building the instrument, it is defining the scaling factors, the criteria, shape and scope.

Dr. MEYER: Mr. Botsford has a last comment.

Mr. BOTSFORD: I feel that the thing which ought to be stressed in the measurement of a temporary threshold shift, that occurs on the average, in normal years as a result of that exposure and I believe that most scientists will agree, if you don't get much temporary hearing loss from an exposure you aren't likely to get much permanent loss in the long run.

Mr. SPARKS: Now, the voice standards at the Department of Labor is using the ones you mentioned in the Walsh-Healey Act and are based on this notion, but do not take proper account of intermittency which is just as important as intensity. They are a simplification of the more complex criteria that have been proposed, which do take proper account of intermittency and duration, but are considered too impractical to use.

Now, there is an instrument that is being developed by the General Radio Company that is based on the loss of temporary threshold shift. It accumulates a voltage, a reading in its memory circuit which is very closely correlated with TTS that would accumulate in a group of farmers on the average, if they were subjected to that same exposure. Now, let me qualify that by saying that it duplicates the data that has been used in the establishment of THL. It does not, it has not been tested in the field on conditions such as yours and that might be something you might consider doing.

Dr. MEYER: Thank you very much for getting us off to such a stimulating start this morning. At this point I should like to ask Mr. Leo Lechtenberg of the Briggs-Stratton Company to come forward.

STATEMENT OF LEO LECHTENBERG, BRIGGS-STRATTON CO.

Mr. LECHTENBERG: We are manufacturers of small single cylinder, four-cycle gasoline engines in the range of 2 to 15 horsepower. These engines are used to power a wide variety of applications such as lawnmowers, tillers, leaf blowers, snow removal equipment, fun vehicles, generators and water pumps, vacuum cleaners, etc. There are literally hundreds of different applications. Briggs & Stratton supports the President's 1971 Environmental Program with respect to noise control. We support reasonable Federal standards for noise abatement.

In 1971, we have information that bills pertaining to noise abatement were introduced in at least 31 states. In addition, municipalities such as Chicago have passed their own legislation concerning permissible noise levels. We would like to see Federal standards that would preempt these state and municipal laws because we believe this is in the best interest of the consumer. The price the customer pays for a piece of equipment including an engine, is dependent upon the manufacturer being able to produce the item and the components in large volume to a specification that will allow the unit to be sold all over the country. It is undesirable to make each model of engine in a variety of ways to meet a multitude of conflicting state and municipal codes. In addition to the manufacturing difficulties, the marketing and distribution problems would become chaotic without Federal preemption.

Any regulation which will effectively lower noise levels will require changes in the design of the equipment covered by the regulations. The time required to innovate, design, test, tool and manufacture these design changes is often neglected or underestimated. Once the new, quieter design is in manufacture, because of the inventory of finished equipment at all levels of distribution, there is commonly a delay of one to two years until previous designs are no longer being sold as new equipment. Under the most optimistic conditions then, a delay of at least two years is required between the time a new regulation is passed and the time when new equipment must meet this new regulation in the marketplace.

Where changes in regulations are scheduled, for example, in 1975 a particular noise level and in 1978 some lower noise level, the number of years for which a given level applies should be made long enough so that the cost of equipment tooling can be recovered. Levels should not be scheduled at intervals of less than two years, and three years would be preferable. Meeting some of the noise levels presently proposed may well require ten years, a period which has turned out to be very short in an analogous situation, the regulation of exhaust emissions on automobiles. In 1963 Congress enacted a Clean Air Act authorizing the HEW Secretary to encourage development and installation of vehicle emission controls. Ten years has proven a short time to develop and test the systems required to meet the desired goals.

Briggs & Stratton Corporation is vitally concerned with noises emanating from engines and the equipment powered by these engines. As early as 1957 we initiated programs and contracts with Armour Research Institute to develop systems to reduce engine noise on mowers and means to quiet the blades of rotary mowers. A large percentage of engines produced by Briggs & Stratton is used on equipment to cut grass. The utility of a device such as a riding mower depends on its ability to cut grass. The noise emanating from the cutter blades and housing can usually be reduced by sacrificing cutting ability. Lower tip speeds and flatter blades are quieter but they do a poorer job of cutting.

More stringent safety regulations often result in a reduction in cutting ability of the blades. Regaining cutting ability by further design changes often results in increased noise. An example would be the increased clogging of grass due to longer chutes, safety guards, etc., installed to reduce the chance of user injury. To overcome this clogging tendency may require a higher "life" or bite of the blade on the air under the mower deck. This contributes heavily to noise. A recent test on an experimental "safe" deck, this was a walk-behind motor, showed such a high noise level that the sound meter showed no difference when a quiet electric motor was substituted for a gasoline engine drive.

Because of the mobile nature of most of the equipment, any quieting devices used must be carried by the equipment which the engine powers. The equipment noise level is influenced by the total engine design including its exhaust system. It is influenced by the shrouding around the engine, similar to the hooding of an automobile engine. It is influenced by the noises emanating from whatever is driven by the engine, for example, the transmission, wheels, tires, mowing machinery, snow blowing machinery, etc. It is also influenced by the environment in which the machine is operated, but this cannot be controlled by the equipment manufacturer.

A commonly held view on outdoor power equipment is that all that is required is to make a better muffler. I'm sorry I do not have the slide for this. This chart shows a 76.5 decibel level for the engine with a standard muffler. This is the engine and motor chassis but without a mower. The chart shown as Figure 1* indicates the noise reduction that can be accomplished on a popular 8-horsepower riding mower by muffler changes only. In studying Figure 1, the cost versus noise reduction should also be considered. The Lo-Tone muffler, which gives a 4½ decibel decrease in sound level over the standard muffler, would cost the consumer approximately $2.00. Another ½ decibel improvement by making a better muffler would cost the consumer still another $2.00 or $4.00 over the standard muffler. The best muffler that would reduce the level another decibel has not been designed as yet, but preliminary work indicates that this muffler would cost the consumer $10.00 over the standard muffler. It should also be noted that Figure 1 is the noise level for the engine and the mower chassis but does not include the rotary mower attachment.

Figure 2 indicates that for single cylinder, four cycle engines, the noise increases as the engine size increases. Thus a 15-horsepower single cylinder powered tractor will be considerably noisier than an 8-horsepower tractor with the same effort on sound treatment. This is a dBA level of 50 feet.

In the engine itself, once the obvious areas of noise such as mufflers, intake silencers, etc., have been quieted, further noise reductions become increasingly expensive. More cylinders, water cooling, use of soft mounts, heavier, stiffer engine mounting frames, etc., all reduce noise but rapidly add to cost. Enclosing the engine with damped and sound absorbing enclosures is an effective noise reducer, but after the first one or two decibels, additional quieting adds rapidly to the cost, bulk and weight of the equipment. The more complete the shrouding, the more difficult it becomes to cool the engine, particularly if it is air-cooled, further adding to cost, bulk and weight.

Although we do not manufacture mowers, we have tried to reduce noise levels on many types of equipment. Based on these efforts, our best estimate of the increased cost of reducing the sound level of an 8-horsepower riding mower is shown in Figure 3. For those of you who do not have the chart, the level of a 3-horsepower engine is 69 going on a slight curve, but almost on a straight line up to 87 decibels for a 15-horsepower engine. This is 3,600 RPM, open throttle, not with the standard muffler, but with the best muffler. This figure shows a 79 decibel level and the standard level drops to 73 with a low tone muffler. If we then put an adequate hood over the engine and put a still better muffler on, we get down to 69, but the increased cost at this point has jumped up to roughly $22.00. But with the quiet hood and the best muffler, $30.00 to a 68 level.

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*The Figures referred to were not submitted for the record.

Then, to get to a 66½ level with an adequate hood, the best muffler or a bald or isolated engine, the jump is almost $60.00. This figure indicates there may be a severe cost penalty to the consumer to attain levels such as proposed in the Chicago Code for 1978, which is 65 dBA at 50 feet, especially on mowers larger than 8 horsepower. Impracticable low noise level standards could easily raise the cost of lawn and garden equipment to the point where their use would no longer be possible by a significant segment of the public.

California Vehicle Code 23130 limits the noise of motor vehicles at 50 feet at 82 dBA after January 1, 1973. Considerable study of all factors involved should be undertaken before a decision is made to legislate that lawn mowers, for instance, should have a much lower noise level than your automobile. Figure 3 adequately indicates the cost penalties of meeting too low a specified noise level. This is very much like the case of a golfer. If he is shooting at a level of 100, it is not too difficult to reduce the score to 95, but once the level of 75 is attained, it is very difficult to lower this level.

The above all pertains to lawnmowers, but there are many other applications which require study to determine the practicability of setting correct sound levels. These include leaf sweepers, vacuum cleaners, mulchers, etc. We do not have much information at the present time on the sound levels of many of these types of equipment.

We agree with President Nixon's remarks in transmitting to Congress the report of the Council on Environmental Quality wherein he stated that a sense of realsim must be applied when seeking to make environmental improvements. Mr. Nixon said, "It is simplistic to seek ecological perfection at the cost of bankrupting the very taxpaying enterprises which must pay for the social advances the nation seeks." He called for development of "a realistic sense of what it will cost to achieve our national environmental goals and choose a specific level of goal with an understanding of its costs and benefits."

I am also Chairman of the Small Engine Powered Equipment Subcommittee of the Society of Automotive Engineers which is a subcommittee of the Vehicle Sound Level Committee of which I am also a member. The former committee has been given the task of developing a Standard for "Exterior Sound Level Measurement Procedure for Small Engine Powered Equipment." The Standard will set forth the instrumentation and procedure to be used in measuring exterior sound levels for engine powered equipment under 20 flywheel horsepower as per SAE J816. It is not intended to cover operation of equipment designed primarily for operation on highways or within factories and buildings, or vehicles such as motorcycles, snowmobiles and marine equipment that are covered by other SAE Standards. In addition, our committee has been requested to write noise levels into the Standard that reflect present good engineering practice on various types of equipment powered by small engines. This information may be helpful to E.P.A. in establishing realistic goals.

We are also a member of Engine Manufacturers Association and agree with their position on labeling as expressed at San Francisco. While it is practical to measure the noise level of engines and establish ratings, it does not appear that labeling of engines per se is desirable. The equipment on which the engine is used changes the noise level in every case and a label on the engine might be misinterpreted by the consumer to mean the noise level of the end item. Also, in many cases we provide no muffler on the engine and the muffler system is provided by our customer. In this case confusion could arise as to what rating label to attach to the engine.

In the case of labeling equipment, there is also the difficulty of determining which accessories are on the unit at the time the sound level is measured. For instance, a garden tractor will have a different level with a mower attachment than it will have with a snow blower attachment. In some cases, vacuum attachments are sold which may be powered by a separate engine. In other cases, additional mowers with separate power units are towed behind the tractor. The conditions may have to be spelled out in the labeling requirements, to be meaningful.

In summary, we are in favor of reasonable Federal Standards that preempt State and Municipal regulations. We would urge a realistic timetable for putting regulations into effect. We would urge that considerable study be given to be sure the sound level specified would be consistent with economic practicability weighed against the medical and psychological hazards of present sound levels. We also believe it would be preferable not to label the engine per se, but to label the end items of equipment on which the engines are used.

Dr. Meyer: Thank you very much, sir. I will first ask Mr. Norton if he has any questions.

Mr. Norton: Yes. At the beginning of your statement, if I read this correctly, let me go over this. You say "we would like to see Federal standards that would preempt these state and municipal laws because we believe this is in the best interest of the customer. The price the consumer pays for a piece of equipment, including an engine, is dependent upon the manufacturer being able to produce the item and the components in large volume to a specification that will allow the unit to be sold all over the country." Then you go on to make each model of engine in a variety of ways to meet a multitude of state and municipal codes. Now, does that mean that you manufacture engines that might be noisier and sold in one part of the country and engines that are quieter and sold in another part, because of the different municipal codes required in those parts of the country?

Mr. Lechtenberg: We do not at present, but if the regulations in various cities are passed and are very restrictive, such as Chicago, it might mean eventually that we would have to make a different engine to go into Chicago than one we would send to some other city. Really, we don't have much control of where its going to end up, it would be a very difficult situation to handle.

Mr. Norton: If you indeed are forced to develop a certain model of an engine to be quieter in order to be sold in Chicago, why then, cannot that engine become standard more or less for the type of equipment that you would sell nationally? Why would you then make a noisier engine to sell in Los Angeles or Denver?

Mr. Lechtenberg: Assuming that some city doesn't pass some ridiculously low levels, this might be applicable but that's why we think it is much better for the Federal Government to set the levels so everybody is on a par. Set the correct level so that you could sell it anyplace all over the country. Otherwise, you might unduly penalize, cost penalize just because some little municipality or somebody sets an unduly strict regulation.

Mr. Norton: You are saying then that the engine might be sold in Chicago would be more costly?

Mr. Lechtenberg: Might be.

Mr. Norton: To the Chicago consumer?

Mr. Lechtenberg: No question if you reduce the sound level, you are going to have to spend more money.

Mr. Norton: Let me ask, I'm not quite sure how to phrase this question, what I want to get at is how much research that is, how much money does your company put into research in noise abatement? That's rather broad, really I am trying to get at what kind of innovative research might you be involved in, either in developing new engines or developing devices to make existing engines quieter and how much that is, what, this is the difficult part, what percentage of your company's profits, let's say, would be put into this kind of research? Do you have any idea?

Mr. Lechtenberg: I don't think I could answer that at the present time and I'm not sure I could disclose the figures for competitive reasons. But, I can tell you we are putting a very heavy emphasis on this now. We have many crews of engineers working on the sound problem and are assembling a large amount of information in this area. Part of this is also due to the fact that the latest safety specifications, which have been published, although I have not seen a copy, it probably came out in the last couple of days, but it calls for an operator level which spells out the maximum noise levels allowed if you are going to put the OPI label on a lawn mower, safety label.

So far there is no legislation that would require this. There has been legislation introduced into Congress to make it a law, but—the Humphrey bill, for instance.

Mr. Norton: Would you be able to answer this question, or could you answer this question of whether the amount of research, the dollar figure of the amount of research that you are doing in this area. Is it at all comparable at this time to the dollar figure for your company's advertising, for example, could you give us any indication?

Mr. **LECHTENBERG**: It is probably considerably larger. I don't have the exact figure, but I would guess it is considerably larger.

Mr. **STRUNK**: On Figure 1, you indicated that an 8-horsepower engine and mower chassis could be reduced from 76.5 dBA down to 72 dBA by installing a low-tone muffler versus the standard muffler, whereas in Figure 3, you show a 8-horsepower riding mower with a noise reduction from 79 to 73 dBA with the same change.

Mr. **LECHTENBERG**: I tried to bring this out that the Figure 1 is with the engine and mower chassis only without the mower, running at 2,900 RPM's and in the case of Figure 3, this is the complete mower running under the maximum noise at 50 feet, so it is a little different test there.

Mr. **STRUNK**: One other question. I wonder if you could indicate what the $2.00 for the low tone muffler versus the standard muffler is in relation to the total price of the vehicle, this 8-horsepower—are we talking about a $200 vehicle, a $600 vehicle or what?

Mr. **LECHTENBERG**: I would say in general, you are talking in the range of $200 to $500.

Mr. **STRUNK**: So then, it is a 1 to a ½ percent increase?

Mr. **LECHTENBERG**: Yes.

Mr. **STRUNK**: Okay, thank you.

Dr. **MEYER**: Well, I'm glad that Mr. Strunk asked the question about the dollar amount. That was concerning me. Sometimes we have to put these things into the right proportion, whether the consumer is going to be taking on a 25 percent increase or a 10 percent increase or a 1 percent increase. It seems to me on a $600 rig that this figure might not be unreasonable at all.

Mr. **LECHTENBERG**: Could be. I didn't mean to infer that it is—I was trying to put the best figure I could. Maybe I should have brought out that the price of the 8-horsepower tractor is probably—I think you fellows can probably assemble pretty good information on that just from a few visits to the lawn and garden equipment stores.

Dr. **MEYER**: Right.

Mr. **STRUNK**: Is the low tone muffler available as an option now?

Mr. **LECHTENBERG**: Yes, it is available. At the present time we are shipping it and you will be seeing it in the field.

Mr. **STRUNK**: It is quite a sizable reduction?

Mr. **LECHTENBERG**: You will see quite an improvement on all of the riding mowers in the coming year.

Dr. **FLETCHER**: Didn't that table apply to a lawn mower without a rotary blade?

Mr. **LECHTENBERG**: The 2nd table is with the blade on it. The Figure 3—

Dr. **FLETCHER**: Just a moment, the one you are looking at didn't have a blade on it?

Mr. **LECHTENBERG**: The blade noise, in many cases, depends on the—mower tends to override the engine noise and much work has to be done on the blade and we are doing work, but I wish we knew a lot better way. We have not been as successful as we would like to be in reducing the blade noise. Part of this is due to the bagging problem. We are trying to assemble information in that area. If you want to bag you need a certain amount of life to throw the grass into the bag. Also, the new safety code requires a low projectory of missiles and this has required a little more lift on the blades.

Mr. **BOTSFORD**: Are you familiar with the report on Leisure Time put out by the National Industrial Pollution Control Panel?

Mr. **LECHTENBERG**: I have read it, yes.

Mr. **BOTSFORD**: Do you consider reasonable the limits for the equipment noise in their Schedule A?

Mr. **LECHTENBERG**: Gee, I am not prepared right at the moment without looking at it. I would be glad to study it and comment.

Mr. **BOTSFORD**: You made a plea for being reasonable. I think everyone wants to be that and this is a recommendation of sorts of the industry and I felt perhaps you had an opinion.

Mr. **LECHTENBERG**: I probably have a copy here, but I would have to look at them. I would be glad to give you a written comment.

Dr. **MEYER**: Is that acceptable? The Chair would like to receive that sir. I have only one major comment to make. That is that I noted in your prepared statement that you made a citation of the California Vehicle Code, pointing out noise limits on motor vehicles at 50 feet, 82 dBA after June 1st, 1973. From there, you go on and imply that then perhaps more rigorous restrictions on lawn mowers might not be appropriate. I think one has to take into account several things and your comparison has some very interesting overtones here because when you take a motor vehicle out here on the highway and are running it over residential streets, its levels are lower than that under the conditions of the test. The riding mower or the push mower or some of these other devices, on the other hand, are operated in areas where the background or the residual noise is considerably lower than that associated with the highway and its presence becomes very conspicuous. And so, you will have to take into account we are talking about environmental quality and not just affects on hearing.

Then, one has to start asking some very hard and very real questions. Can we permit higher levels from these devices to be introduced into such a quiet environment? Should we try to get the test technology to reduce the interference with, shall we say, the quality of the environment? I don't believe there is a direct analogy here between highway vehicle noise and noise produced by machines which are to be used in relatively quiet areas where people have been sleeping or listening to the radio or the hi-fi or the television or whatever. And I think this is a dilemma we are going to have to come to grips with.

Mr. **LECHTENBERG**: If I understand correctly, this level is the 50 feet for an automobile passing at 35 miles per hour.

Dr. **MEYER**: That's quite different from mowing the grass in your front yard, perhaps in some residential areas which are not as well blessed with space as in Colorado, but maybe only a lawn at the side of the house, maybe 10 feet wide. On one side or the other there is a bedroom.

Mr. LECHTENBERG: That should be evaluated. Incidentally, if I may, I would like to bring out this point. So far, the preliminary work of the SAE Committee indicates that our reading at 23 feet, 7 meters is much more consistent and accurate than at 50 feet. I don't know in setting up the levels that it is desirable to set the level at 23, but at the moment our committee seems to be measuring at 23 feet. It takes out the variables of wind and a lot of things we get at 50 feet. It is impractical for big equipment.

Dr. MEYER: There are some other good reasons for this soo. As my colleague, Alex Baron, points out, in some of these residential and suburban exposures, you are not talking about 50 or 100 feet, you are talking about much closer proximity. Therefore, if you really want to assess the impact that's something we are going to have to work out. Any other questions from the panel?

Mr. STRUNK: We hear a lot of discussion about the affect of mufflers and the durability and the performance of engines and what it is going to cost. I wonder if you could indicate what reduction in performance occurs with your low tone muffler and what affect this has on the durability of the engine?

Mr. LECHTENBERG: We do not think it is bothering the durability. We run the exhaust seat a little hotter but it is livable and we do probably lose about 5 percent. This however, is only a question of how much space you allow the muffler. If you make the muffler big enough, you don't lose that.

Dr. MEYER: Thank you very much, sir. I would now like to call on Dr. Jack A. Williford of Colorado State University.

STATEMENT OF JACK WILLIFORD, COLORADO STATE UNIV.

Dr. WILLEFORD: Mr. Meyer and members of the panel, guests, some of the comments which I wish to make initially regarding agricultural noise are designed very nicely to reinforce some of the statements made by Cecil Sparks earlier in his testimony. Because you will notice that one of the references listed for documentation of some of these facts are taken from the R-4 study, which was an excellent and detailed study by the San Antonio Research Group. They are also based on our consultations with our Department of Agriculture at Colorado State University, which is a land grant institution and with our State Extension Service personnel. They are also considered with some of the experiences in the hearing clinic record that we have in our hearing clinic at Fort Collins, and as a result of interviews with farmers. Also some studies we have done which are limited as yet, one that's very closely related to some of the questions earlier in a study we have presently in design both at our laboratory and a mobile laboratory at CSU, with a captive audience of agricultural major students, largely from the farm area with their siblings and with their farmers to look at some of the correlations and other factors.

A great deal has been written in recent years about the growing concern for excessive noise in the environment. This literature reflects, almost unanimously, man's reaction to sound which is unwanted, uncomfortable and often unhealthy. Paradoxically, it is a situation which man himself has created in his quest for powerful and more productive machinery, for larger and faster modes of transportation. As our population has expanded our mechanized social and industrial tools have also grown in numbers, the result of which is ever-increasing noise—one can literally hear the population explosion as it occurs. Moreover, the problem is compounded for the masses by the concentration of people in metropolitan areas. Fortunately, the problem of noise pollution in urban regions has come under close scientific and political scrutiny and both state and national regulatory measures have been passed into laws that should, with present technology, bring noise in these population centers under adequate control.

Agricultural and recreational use noise, however, has received much less attention. I am gratified, therefore, that this regional hearing is directed toward this end. While agricultural noise involves far fewer people than does industrial noise, it is nonetheless critical since modern farm implements have also become noisier. Damage risk criteria for operators of such equipment are also fewer since the exposure patterns to acoustic stress are quite different from those in industry where most noise controls were developed, but where noise is also largely constant and where the worker is confronted with it daily in lengthy, often life-time, cycles of employment.

Although certain criteria have been evolved for intermittent noise, such as those in the Walsh-Healey Act, no provision is made for long-term exposures to noise which varies widely in momentary acoustic energy, in duration patterns, and which is seasonal. Such is the mode of agricultural labors, a fact which suggests that the Walsh-Healey criteria for intermittent noise may be inadequate for applications to farm and construction environments.

There is ample evidence to show that tractor operators sustain permanently reduced hearing sensitivity that increases progressively with years of exposure—and, it's little wonder. Many tractors generate noise which exceeds 90 dBA, and may range as high as 104 dBA depending on the horsepower of the engine and the degree of power or loading at which the engine is operated.

It is also common practice, today, for farmers to have protective cabs or canopies installed on tractors. These additions, if not properly designed, may serve to further increase the noise level at the operator's ear. Nor is agricultural use noise confined to tractors. The trend has been toward mechanization in many farm operations (self-powered combines, corn-pickers and shellers, etc., some frequently used in combination with tractors), so that the exposure to farm noise has increased substantially.

Thus, I believe there is an urgent need for greater research focus directed toward agricultural operations, the primary goals of which should be: To develop greater knowledge concerning the damage induced by variable-intensity, intermittent noise so that safe exposure durations can be developed and recommended; 2, to implement noise reduction measures at the manufacturing level; and 3, to generate more precise information regarding the work-habit patterns of farm personnel. These goals are not easily obtainable for several reasons.

First, manufacturing controls will no doubt involve substantial economic considerations which may be passed on to the buyer of farm equipment. Such controls include redesigning air intake and exhaust systems, and engine cooling methods.

Second, there are technical problems in assessing damage which results from intermittent noise exposures—a limitation in the efforts which have been directed at industrial noise.

A third difficulty is that of establishing a meaningful index to farm environment duration-intensity exposure patterns. While some helpful studies have been carried out to help define a "typical" day in the life of farm equipment operators, much greater knowledge of this subject is necessary. The reasons for this void are many.

For example, there are different modes of farming which are dictated by geographic location, success or failure in crop productivity, magnitude of acreage, the number of workers on a farm and job rotation assignments among the personnel on a given farm, personal motivation, philosophical differences over what facets of farming constitute the particular farmer's total operation, and the weather. These and other factors preclude easily established exposure predictions. Such information may only become available through detailed and long-range surveys with a wide and stratified population from the agricultural community.

Assuming these problems can be resolved, an interesting question remains. To what extent are regulatory laws governing the operation of farm equipment practical and would they be justified? While the protection of hearing is a desirable goal for any citizen, many farmers are self-employed and either conduct the operation of the farm by themselves or share it with members of the family. Is it desirable to enact laws which protect a man and his family against himself? Does it facilitate his seeking judgment against an equipment manufacturer for his loss of hearing and is it necessary for him to do so? Or are existing laws adequate for this purpose?

Perhaps the answers to these questions can be supplied during this forum. As for the farmer who employs personnel to carry out his operation, who exposes persons other than himself and members of his family to noxious auditory stimulation, it seems to be evident that the same principles which precipitated existing industril noise statutes would apply. Whatever laws may eventually be evolved, they should be accompanied by a vigorous program of educating the farmer regarding the hearing-damage risks of his occupation and strong encouragement of the use of personal protection (muffs-plugs). This program could be carried out through government bulletins, the media, farm journals, and more directly through personal contacts by county extension agents and county health personnel.

I think, perhaps, our largest failure in this whole area has been lack of public education. I understand at yesterday's hearing we had a couple of motorcycles here for demonstration purposes showing what mufflers can do and I must admit, like the average citizen, I suppose that you took note only of the loudness. I know of one residential area in Fort Collins in the same block where two men, not kids, have racing bikes and they really have the neighborhood up in arms. We pay less attention to those that do have proper noise precautions built into them and I noted that particularly driving down this morning that there are some quiet motorcycles. I was pleased to observe that.

Noise has also invaded man's recreational domain so that it has become a problem today, in many instances, to even pursue one's preferred means of rest and relaxation. During such periods is when noise becomes a particular irritant. For example, if it is one's choice to read, sleep, or watch television on the weekend or on his day off, it has become common experience for neighborhood noise to disrupt his period of leisure. The teenager across the street "lays a little rubber" as he leaves the drive-way in his hotrod, the motorcyclist down the block "revs" his bike interminably prior to departing on a joy ride, or the backyard neighbor cranks up his new power mower—all shattering your personal peace. You decide that the answer lies in "getting away from it all" to an alleged wilderness area to camp, read, hike, ski, or fish a sleepy lake. Because you are not alone in your effort to escape stresses of urban living, you suddenly discover that you have lots of company in your once-remote retreat. "Acid rock music" suddenly pierces the air, propogated by the transistor radio of a new arrival, you are shattered by the passing of an outboard motor powering a boat pursued by a water skier. If you are a snow buff your skiing is more frequently being interrupted by one or more of some 1.5 million snowmobiles.

It seems there is no escape for man, and conservationists are beginning to question what noise may be doing to wildlife as well. Whatever the noise source, it is more traumatizing in many recreational areas because of the low ambient background levels typical of those areas. It has long been known that aperiodic, or irregular, noises which rise above the usual noise level of the environment are those which are most disturbing. They serve generally to disturb one's tranquility and efficiency, however, as opposed to inducing damage to the hearing mechanism. Notable exceptions, of course, are the snowmobile, loud music, and firearms for the hunter and skeet shooter, all of which may cause permanent threshold shift.

The state of Minnesota and the city of Chicago have enacted laws relating to snowmobiles, but noise from firearms, aside from the military which exercises some controls, and lengthy exposure to loud music remains unregulated. Like agricultural noise, such noise is self-inflicted without awareness of its potential harmful effects. Thus, public education seems to be the answer for shooting enthusiasts. Legislation limiting motorcycle noise is an urgent need in my judgment. The same, I feel, is true for power lawnmowers and similar devices even though noise has been shown to be synonymous with "goodness" by many consumers.

Agricultural and recreational use noise is not a fantasy, and whether it is unhealthy or only annoying I am convinced that it must be controlled if we are to restore tranquility to our burgeoning population.

Noise in agricultural and recreational environments interferes with efficiency and disturbs one's tranquility, while other noises are capable of producing permanent damage to the human hearing mechanism. Such noise sources effect fewer people than found in industrial areas, but nonetheless constitute serious concern. Noise associated with these activities also present unique problems in terms of their variable levels and durations of exposure since damage-risk criteria are not as well defined for intermittent variable noise as for the more constant types of noise found in industry and transportation. More research is needed to understand and resolve the problems involved.

One final comment because I don't know how it applied either subject, agriculture or recreation. That which deals largely with the adult population is toys. Toys are getting a lot of heat in certain quarters, but I think most of us have heard some of the toy guns that kids can purchase today. They have unbelievable impulse noise levels.

Dr. MEYER: Thank you very much. Before I ask a couple of questions I will ask the panel if they have any questions, beginning on the left.

Dr. BERRY: I would like to share with Dr. Willeford a point which has not come up so far, and that has to do with product liability. Probably would not be the sort of thing I would want to introduce to a manufacturer, but if General Motors, with an unstable vehicle such as the Corvair knew, or should have known that this was unstable on the current basis of the state of the art, good engineering practice, then do you think that a manufacturer of a noisy piece of equipment, who knew or should have known that this was possibly dangerous to the hearing of the consumer, let alone those nearby, do you think that there is an aura of question about it there? I presume that you are not a lawyer and I am not. I am just wondering about your reaction.

Dr. WILLEFORD: I certainly do, as a citizen and as a professional person concerned with hearing, yes I do.

Dr. FLETCHER: I am pleased you are concerned with toys and at least one area of regulation of toys has been given to the Food and Drug Administration, believe it or not, and the Food and Drug Administration under the Band Toy Act has acted to regulate not only the usual toys but things like firecrackers and it might amuse you to know that under the Act that they have now regulated caps and cap pistols to the extent that the instantaneous peak pressure permissible from any cap pistol configuration is to be no greater than 158 dB instantaneous peak at 25 centimeters from the ear and I can assume you this is under the conditions of use reasonably safe and further more they say the manufacturer must label all of the caps potentially hazardous to hearing, do not shoot indoors or closer than one foot from the ear. Things like that being picked up and taken care of.

Dr. WILLEFORD: That's great. I notice that there is a good bit of local community control of this kind and thing.

Mr. NORTON: Dr. Willeford, I want to commend you for your comments. I share your concern over recreational noise. You alluded to the fact that we did have some motorcycles here yesterday to demonstrate the relative affects of muffling. One of the things that I think we actually need to recognize at this point is that we are talking about relative terms. That is one of the motorcycles which I understand was a racing type was painfully loud, the other was what I would term tolerably loud and I think we have to keep in mind, the type of environment in which these are used. The quieter motorcycle, I think would be tolerable on a street and certainly in a suburban area. However, in the tranquility of a forest, I still think that it could be a shattering experience to have several of these things come up the trail. I have a question I would like to ask of you, mostly an opinion, not a question.

That is, we've had several comments now on agricultural equipment noise problems which say that in effect perhaps it is not as much a social problem because it is only the operator that's involved and we have a great deal of space isolation that tends to buffer the impact of that sound on the public at large. But as Mr. Botsford pointed out this morning, much of this equipment is not, I should say, some of this equipment is not exclusively confined to agricultural use. Some of it does find its way to golf courses, roadsides and some areas where there is more contact with people and also you have the phenomenon of urban sprawl now, which is bringing more people to the interface of farm lands and therefore, more susceptible to impact from this noise level. I wonder what your feeling is with regard to setting standards on these vehicles and considering future impact, perhaps higher density impact of these on the population in general?

Dr. **WILLEFORD**: I think that it is a very appropriate question and I do know that a number of municipalities are concerned with ordinances which dictate noise levels in certain areas. The motorcycle incident in Fort Collins that I mentioned is—they probably couldn't get away with it in town, but they do live in a fairly dense population area outside the city limits. The fellow that related the incident lives in the same block with them. He is about to move because he has called the police and he has inquired from the County Sheriff what kind of measures that anybody in that area can take and they have no recourse. And yet, it is most disturbing to quite a number of residents. The Department of Transportation, as you gentlemen probably know, are quite concerned with this kind of problem of designing and zoning for metropolitan areas, at least to attempt to bring this kind of thing under some kind of reasonable control.

Dr. **MEYER**: I would like to note that I share Mr. Norton's observations, particularly the comment that one motorcycle running by a residential suburban area might not be too bad but what concerns me from the environmental quality viewpoint is that you might have 5 or 6 or 7 together, and, using the laws of physics the decibel level goes up proportionately. I am also concerned by the fact that this may occur and that 5 or 10 minutes later here comes 3 more. And no matter what standards the Federal Government sets on noise emissions, this is going to be a nuisance because it is going to interfere with the enjoyment of one's home. Somehow or other we have to regulate this.

This leads to the question, I wonder what your view is as to what level of government ought to deal with this sort of a problem?

Dr. **Willeford**: Just off the top of my head, I would probably judge that it might be best handled by state and local governments because conditions differ so widely in the geographical United States as you know. Something might be acceptable in a given area but certainly not in small communities, and as we have alluded to here, it is the sudden noise rising out of quiet that is the most annoying, whether it is damaging to hearing or actually unhealthy or not is one thing, but what gets people up and legislation has dictated to a great extent, as we learned in the SST controversy and similar events when citizens complain.

Dr. **Meyer**: I think that's very well said. One of the things I want to emphasize is that we are just as interested in these views of citizens as we are in those of organized groups. I think citizen views have to be looked at very carefully outside the context of organized efforts. Any other questions panel? Thank you very much, sir. I appreciate your statement, it will be most useful to us. The next witness is Mr. Robin Harrison representing the Sierra Club.

STATEMENT OF ROBIN HARRISON, SIERRA CLUB

Mr. **Harrison**: By way of introduction, I would like to say that although I represent the 140,000 members nationwide of the Sierra Club, today since the subject of the hearing is recreational noise, it may be pertinent to say that I am also a user of motorized recreational vehicles, having owned some 54 motorcycles, boats, jeeps, etc., in my life. I will briefly discuss what the Sierra Club's stand has been on noise in general, what we feel are significant areas of noise pollution in recreation, and what we feel should be done to alleviate the noise problem.

The Sierra Club's involvement with noise pollution began May 4, 1946, when the board of directors voted to reiterate its opposition to the use of airplanes in wilderness areas. This opposition arose mainly from the noise created by such use and we still feel that aircraft are incompatible with wilderness areas, wild areas, and primitive areas. The club has since then made recommendations about the use of aircraft, trail cycles, snowmobiles and vehicles in general, and has made specific recommendations regarding land use planning, airport siting, research, legislation, and jurisdiction of noise pollution problems, etc. Attached to my written testimony is a summary of Sierra Club policy related to noise pollution, as well as a resolution of the Executive Committee of the Angeles Chapter of the Sierra Club dealing with noise pollution.

The Sierra Club believes that one of the most valuable aspects of outdoor recreation is the peace of mind and restoration of spirit that come from the separation of man from his normal, noisy existence. We believe that these quiet little islands in time are a necessary part of the enjoyment of the outdoors, and we therefore oppose the use of any noisemakers in any wilderness, de facto or declared.

I would like to concentrate my statement on three particular areas of noise pollution which the Club feels deserve your immediate and special attention; aircraft flyover, motorcycle, and snowmobile noise.

There are other sources of noise pollution that are common and increasing. Outboard motors, portable generators, chain saws, all cause serious problems in localized areas. The noise of transportation to and within developed camps and parks is of growing concern. However, airplanes, motorcycles, and snowmobiles are by far the worst noise offenders in our outdoor recreation areas.

Aircraft flyover noise is a serious detriment to the enjoyment of outdoor recreation areas for many people. While engaged in research near the Sespe Condor area of the Los Padres National Forest, I was unable to take acoustic data for fully 20 percent of the workday because of aircraft flyover noise. The impact of aircraft flyover noise on other recreation areas such as Mt. Whitney, California, cannot be over-emphasized. There are helicopter and fixed wing sightseeing tours flown in such areas as the Grand Canyon every day. Each sightseeing plane, holding four to eight tourists, disturbs hundreds on the ground.

We, therefore, recommend that agencies responsible for routing aircraft, both military and civil, insist that speeds, altitudes, and route locations be so arranged as to minimize the noise impact on heavily used outdoor recreation areas—areas of special interest—wilderness areas—and areas especially fragile to noise pollution, such as certain wildlife preserves.

The second area of major concern to us is the noise pollution caused by motorcycles and motor scooters. The number of users of off-road recreational motorcycles and scooters is increasing rapidly. It is noteworthy that Senate Bill 1016 and House Bill 5275, now under consideration by the U. S. Congress, single out recreational motor vehicles as a significant noise source.

The concern over motorcycle noise has also grown rapidly. We do recognize the excellent work done by such groups as the Motorcycle Industries Council to persuade motorcycle dealers and owners to sell and use muffler-equipped motorcycles and to operate them in a manner that will not result in excessive noise. However, we feel that all but the quietest motorcycles are louder than they need to be, from a technical point of view, and believe that with continuing effort, the motorcycle industry could produce motorcycles that emit no more than 75 dBA at 50 feet under maximum noise conditions. Indeed, according to the Motorcycle Industry Council's own testimony, at least three popular motorcycles now meet this criterion.

We, therefore, recommend a Federal standard for all motorcycles sold in the United States of 75 dBA under these conditions, effective in no more than four years. The possibility of further reductions should be studied.

One possible impediment to the development of a quiet motorcycle is the lack of a universal standard for the measurement of motorcycle noise. We, therefore, recommend that the Environmental Protection Agency immediately start work on establishing a noise measurement method for motorcycles and, for that matter, for snowmobiles and other off-road vehicles, taking into account the excellent work done so far by the Society of Automotive Engineers and other similar organizations.

The club recognizes that motorcycles have a legitimate place in wilderness areas. However, we believe that motorcycles should be excluded from all de facto and de jure wilderness areas, all wild and primitive areas and all National Parks, except on established motor vehicle roads, and we believe that in other areas motorcycles should be restricted to established roadways except where it is definitely shown that their off-road use will not be of detriment to any aspects of the land.

It is well established that many motorcycle riders remove the effective muffler from their machines, in the mistaken belief that this will increase the power of their equipment. We, therefore, recommend a study into the motivations of such thinking and an educational program in conjunction with industry groups for the elimination of this type of thinking and activity.

Perhaps the most serious noise hazard faced by wilderness areas throughout the United States is that presented by the snowmobile and the all-terrain vehicle. Whereas motorcycles and other motor vehicles are largely limited to trails and roads, snowmobiles have nearly absolute freedom throughout the winter forest. The damage that they do to wildlife and flora has been the subject of much research, but as of now, this damage can only be estimated. The effect on wildlife of the noise from these machines may be devastating. Imagine, for example, what must happen to the physiology of a hibernating bear when he is awakened by a charging pack of snowmobilers outside his cave.

The snowmobile industry has generally conceded that it will soon produce snowmobiles to the SAE standard of 82 dB measured at 50 feet. We do not feel that this is sufficient, but that a 70 db snowmobile should be required as quickly as is feasible, within certainly no more than three years, with subsequent reductions of noise level in years following. Exactly what would this 12 db reduction mean?

The background level of the average forest is approximately 45 dBA. An 82 dB at 50 foot snowmobile, then is inaudible at 1,000 feet, whereas a 70 dB snowmobile would be inaudible at only 375 feet. Under special conditions such as very still winter forests, these snowmobiles are audible at much greater distances.

Research done by the National Research Council of Canada indicates that a 70 dBA at 50 foot noise level could probably not be achieved with existing designs of snowmobiles, thus major redesign would be necessary. However, the California legislature is considering, and Montana has passed, bills requiring snowmobiles and all-terrain vehicles manufactured after January 1972 to achieve a sound level of no more than 75 dBA at 50 feet.

The Sierra Club firmly believes that snowmobiles and all-terrain vehicles must be restricted to established roadways and tracks unless it can be definitely shown by the land managing agency that their off-road and trail use would not be detrimental to the environment. They must be rigidly excluded from all wilderness areas. We feel that in a majority of even non-wilderness outdoor recreation areas the noise pollution aspects of these vehicles makes them unsuitable for use except in locations set aside especially for their exclusive enjoyment.

In general, if I had to characterize the feelings of nonmotorized remote area users towards any vehicle noise in two words, I would say "extremely negative". The intrusion of this noise into the "wilderness experience" might be illustrated by a recent personal encounter. I was climbing along the shoreline north of Ensenada in Baja, California. All I could hear were gulls and waves. I was completely immersed in my surroundings, completely happy with a restorative kind of happiness that only those who love wild places can know. The eternity of the sea and the majesty of the cliffs had taken me away, at least for a little while, from the cacophony of our current life style. Then, even louder than the ocean, a trio of motorcycle riders appeared on the edge of the cliff. They were having a great time, romping over the plain. But the presence of their noise ruined my enjoyment of the place. I resented their noise, I resented them—and remember, I am a motorcyclist myself.

In summary, the Sierra Club believes that all mechanical equipment and its attendant noise should be rigorously excluded from all wilderness areas, all wild areas, and all National Parks. We believe that the motorized outdoor recreationist has a legitimate place, but that his equipment must be silenced and he should be limited to those areas in which the noise of his machinery is not detrimental to the environment. Freedom from unnatural noise is a major feature of wilderness. Most wilderness is held in public ownership. The encroachment upon that freedom by any group or individual has the effect of reducing or destroying the essence of wilderness, which must be preserved.

Dr. **Meyer**: Thank you very, very much sir. I will ask my colleagues on the extreme right if they have any comments or questions.

Mr. **Norton**: I think you make some very, very good points in your testimony. I was particularly pleased over your recommendations that considerations be given to controlling aircraft noise over wilderness areas. A point that I made yesterday was that in the past I think we have deluded ourselves in the establishment of the wilderness areas because these have really turned out to be wildernesses in 2 dimensions only and I can recall some rather unpleasant experiences of my own, a raft trip on the Colorado River through the Grand Canyon, which is one of the most spectacular places on the face of the earth and you would expect it to be relatively free from motorized intrusion. And, it is, except when occasionally a sonic boom shatters the environment of the place and I don't think you can really comprehend how bad this is when you are in the confining walls of a steep canyon. It is frightening and in fact, it is damaging and has damaged Indian ruin, I understand, in some of the canyon country in the Southwest.

I was interested in your comments also on your recommendations on controlling the use of motorized vehicles, not only in statutory wilderness areas but de facto wilderness as well and I think this is an important consideration. In fact, I think in conservation circles, you are probably aware of this, there has been recent discussion on the idea of a moratorium on motorized intrusion in at least on federal lands where there are significant wild life populations because of the fact that we simply do not know at this time what the impact of recreational vehicles are going to be on wild life populations. I think this has come out strongly in this hearing.

The fact that we don't have the data yet and rather than repeating the mistakes we have so often made in our society of allowing things to happen and then suddenly discover that there are some adverse impacts and also discovering that perhaps it is too late to really control it because it is such a traditional thing and has become a tradition and ingrained use of the land and I wonder how you feel this type of moratorium say, on Forest Service Land and BLM lands that would perhaps, halt the intrusion of motorized vehicles over these areas until such a time as we can really determine carefully the ecological impact?

Mr. Harrison: I don't think that there would be—I think first the Sierra Club would be very much in favor of a moratorium on motorcycles. I don't believe that there would be even too much resistance among the motorcyclists. The areas that are the choicest for trail riding and blasting around are not the areas that are heavily populated with wild life or other outdoor uses, hikers or mountain climbers, that sort of thing. I think the forest service has done some excellent work in setting up established trail vehicle routes where we have set aside certain roads and trails for the guys to ride their bikes on. And although you have a good number of motorcyclists who enjoy getting off the trail and going up the hill, I think most of them realize the ecological degradation that might take place and I don't think there would be too much objection to it.

Mr. Norton: What about desert country? At times, you know, we tend to concentrate on ecological concerns on the land of mountains, blue lakes and forests. I happen to be a desert lover myself and I can recall a recent issue of Life Magazine and I think the whole issue was devoted to the, it seems the endless weekend or the lost weekend, leisure time activities in the American public and there was a double photograph of what looked to be hundreds of motorcycles racing across some section of the Mojave Desert and we have always considered desert areas to be bleak and barren. And yet, I think we are also just now learning that the desert itself has a very unique and perhaps important use to us ecologically. That we have to take into consideration these factors and how do you feel that this sort of—

Mr. Harrison: I would give a qualified yes. I think your observation that the desert is an important ecological subject is a valid one. It is one of the most fragile of the eco systems. It takes a very, very long time to come back. However, this is an area that is very attractive to motorcyclists, especially competition riders. There are, despite how it looks when you see 1,000 scooters thundering across the desert, the routes are well defined and fairly localized and I believe that with intelligent cooperation with people like the National Trail Riders Association and the American Motorcycle Association, areas of the desert and segments of the desert could be set aside for the bikers, without any problem, without any lasting degradation.

I think about a place though, called Red Rock Canyon, which is unique because it has some Indian petrocliffs. It is also unique, it is a great place to race and here is a place where there would be the tendency to throw the bikers out, but I believe a land use zoning could be established for the desert, which would exclude cycles from large portions of it, but still give them access to the parts they like best.

Mr. Strunk: Mr. Harrison, you have specified that you recommend two different noise levels. One for snowmobiles and one for motorcycles. I wonder if you will explain why you testified this difference?

Mr. Harrison: Primarily on, well not primarily, solely on technical considerations. The snowmobiles are technically easier to silence. Now, we will hear later from someone from the snowmobile industry who will disagree with me, but I have read everything I can on this and done some work myself and the nature of the snowmobile is that it has an enclosed engine. Exhaust noise of any recreational vehicle is the primary noise source and that can be silenced fairly satisfactorily on both motorcycles and snowmobiles.

Then, what comes into play is air intake noise and this too can be handled without too much added expense. But with a motorcycle you have an open structure and all the mechanical noise is very difficult to do away with. You have got slapping chains going up and down, gears, pistons clapping around, whereas with snowmobiles you can design a nice fiberglass shroud over this intake and maybe even put a blower on it so you can have an enclosed engine system. And, technically, I believe the silencing of the snowmobile is quite feasible. The excess problem of the snowmobile—it is pretty hard to hold them to a trail. If they are going to get into open country then I believe that they have to be quieter because they will be able to put themselves in closer proximity with other uses of the wilderness.

Mr. Strunk: Thank you for your comments. It is interesting to note that you are thinking of the industry and what technical progress can be achieved.

Mr. Botsford: You said something about noise awakening hibernating bears. Was that speculation?

Mr. Harrison: That's entirely speculation, sir. Although I think we will hear later from somebody who might shoot me down or agree with me.

Mr. Botsford: Just a possibility?

Mr. Harrison: Yes.

Dr. Meyer: It is an interesting idea. I happen to be familiar with work done by the Medical Laboratory in which efforts were made to implant transmitters into hibernating bears and follow them along. I don't recollect the specific data that was found, but apparently hibernating bears do not sleep all season. Although, I'm sure there are some naturally. I am going to try to track down the results of that study because they did indeed make some effort to get information televised from bears who were released into the wilderness area near Fairbanks, Alaska. And I'm sure some of those weren't too far away from points of human habitation and noise sources. They were able to pinpoint the location of the animals by their television system.

Mr. Harrison: I was aware of the study.

Dr. **Meyer**: I haven't seen the results either, but I am glad you mentioned it.

Dr. **Berry**: You indicated that you have owned 54 recreational vehicles over a very short life period?

Mr. **Harrison**: 15 years.

Dr. **Berry**: We are going to compare the color of your hair and mine.

Mr. **Harrison**: That is not quite correct because just yesterday I bought another one, scratch that and make it 55.

Dr. **Berry**: Then my question becomes a little more relevant. Have you of those 55 vehicles, made a choice, determined the final choice on the basis of the noise level, was that a deciding factor?

Mr. **Harrison**: Only the last one, the one I just bought. I did consider that when I purchased it.

Dr. **Berry**: So the Sierra Club has been interested in this since 1954—46, and you say as an avid Sierra Club member you have just now—

Mr. **Harrison**: Let me, can I defend myself?

Dr. **Meyer**: Certainly.

Mr. **Harrison**: The bikes I bought without consideration to noise were strictly racing machinery.

Dr. **Berry**: On the basis of the enthusiasm that the Sierra Club would have to defend the wilderness, do you think that the Sierra Club would, should, or might provide information for their membership which would then be made available in a public listing of recreational equipment with their noise ratings and urge them to buy those that have the least noise level?

Mr. **Harrison**: Yes, and as a matter of fact, the Angeles Chapter Noise Subcommittee of which I am a member is presently compiling a list of quiet recreational equipment and quiet construction equipment as well. The idea behind the construction equipment is the city of Los Angeles has asked us to do this.

Dr. **Meyer**: Could you submit this for our use; we are trying to accumulate everything like this we possibly can. Would you submit what you have done on this? I'd like to get it as a matter of exchange.

Mr. **Harrison**: We'd be happy to.

Dr. **Berry**: Do you think that the Sierra Club members would be unduly influenced in the purchase of a vehicle because of the additional cost of $2.00 for a muffler?

Mr. **Harrison**: Oh, no.

Dr. **Berry**: I realize we are talking about lawn mowers, which is a utility item.

Mr. **Harrison**: The problem, if I can expand on that, the problem with motorcycles is not the mufflers. The industry has done a fine job with exhaust muffling. I think probably the major noise source with some motorcycles, especially the larger ones, is air intake and mechanical although some do have rather large mufflers. The industry is quite capable of making a quieter muffler, I'm sure, without even a $2.00 cost expense. We'd be happy to pay, I'm sure, $2.00 or even $20.00 for a better muffler.

Dr. **Fletcher**: That's a good point to bring out. One of the things—I'm not an automotive specialist, one thing that was brought out in San Francisco by some people on the panel, as well as some witnesses, one of the problems with air-cooled engines is the radius of noise around the cooling fan. It is not only the actual generation of the noise with the passage of air over the fan, which does help generate the noise, but because of its very nature it is re-radiated by the fans and does create problems which are not insurmountable.

Dr. **Meyer**: First I want to thank you very much for a very forthright and very excellent position paper, which will be most useful to us—particularly some of the recommendations regarding standardization of measurement techniques. This is something that one of the people on my staff is concerned with in a technical assistance program. He is here and I am going to see to it that we begin to pick up on that because it is an area that needs some close work with industry and other groups.

You might also be interested in knowing that the Federal Government has established an interagency committee to deal with the problem of off-road use vehicles to take account, not only of noise, but all other environmental aspects.

One last point. I noted in your statement you had done some acoustical work for the Department of Agriculture Forest Service. Just for my own information, as well as for possible future coordination, would you mind telling us a little about that?

Mr. **Harrison**: I am the Project Engineer at the Equipment Development Center of the National Forest System's Research and Development Facility. I am here today, I must make it absolutely clear, not as a representative of the Forest Service.

The two projects that we are currently engaged in, one is the evaluation of noise plugs and possible hearing damage, resulting from the use of logging equipment. We have done a study on chain saws, which has been published and we are working now, next year when we get under way, with skidders, log trucks, with emphasis on the Jacobs Brake.

The other project is the establishment of a standard method of measurement for noise from off-road vehicles.

Dr. **Meyer**: Both of which are of extreme interest and I am glad to get that into the record. If there are no further questions, thank you very much. We hope to keep in close contact, both with the Sierra Club and with you personally.

At this time, as it is a quarter to 12, I would like to ask Mr. Roger Yoerger if he would like to add something to his remarks of yesterday and then we will adjourn for lunch.

STATEMENT OF ROGER YOERGER, UNIVERSITY OF ILLINOIS

Mr. **Yoerger**: Yesterday I made the point that the main problem with agriculture equipment was the occupational health and safety of the operator and by standards and Mr. Norton commented on that just a little while ago. One exception to this that is becoming quite important, at least in the Midwest that I had intended to mention and did not is a problem of noise plugs associated with the crop dryers. Crop dryers ordinarily are operated either near the farmstead and also quite often near elevators or grain storage facilities at railway right-of-ways in the small towns and the big cities.

During the harvest season, these crop dryers run 24 hours a day and oftentimes the fans associated with them, they generate sound levels of 100 dBA or higher in close proximity, but they do spread out over a very large area in nighttime operation. And the background levels go way down. This crop dryer noise sticks out like a sore thumb and many people are concerned about this and say that they can hear it and it disturbs their sleep and it is a problem.

Dr. **MEYER**: Any idea of the radius of effect?

Mr. **YOERGER**: Oh, it would not be uncommon to have this extend over a radius of maybe a mile or so.

Dr. **MEYER**: So, if there was ore located near a small community or not a small community, and particularly here in the Midwest or intermountain area they, are not so very remote from fairly built-up areas?

Mr. **YOERGER**: That's correct. If they are operated in the fall the problem isn't as bad because the people generally have the houses closed up. But, with the weather like we have been having in the Midwest recently, it does get to be a problem.

Dr. **MEYER**: I appreciate your bringing this to our attention. I think we are going to get together with the Department of Agriculture and start to take a look in order to see what's reasonable and feasible to come up with better designs on these things.

Mr. **YOERGER**: If we are talking about property line regulations, these are going to come into play. I might say if you have another minute, mention an experience I had. A couple of years ago, a manufacturer had a dryer that utilized a little different design on his fan and he thought he had a noise advantage and asked to have this documented. In making measurements it was found that the noise generated from this particular dryer in operation was, I believe 6 to 8 dB lower than comparable equipment.

However, he had just designed a new model in which the fan speed was increased and in the new model there was no difference. Really, he has lost the advantage of trying to improve that aspect of his machine.

Dr. **MEYER**: Any questions from the panel?

Dr. **BERRY**: I don't recall seeing a grain dryer that does not have an Axial Fan.

Mr. **YOERGER**: This one I was talking about had a squirrel cage fan.

Dr. **BERRY**: An Axial Flow Fan versus the squirrel cage fan with an enclosed housing?

Mr. **YOERGER**: Yes, these are what we call semi-pressure fans. They have to work against the high static pressure, higher than what you find in an air-conditioning system, 3, 4 inches of water and higher. But you are right, the typical fan is an Axial Flow Fan.

Dr. **BERRY**: Which is inherently noisy?

Mr. **YOERGER**: Some of them operate as high as 3600 RPM's.

Dr. **MEYER**: Any other questions?

Mr. **NORTON**: My reason for bringing this up this morning, I simply wanted to express my concern that we not overlook some future problems with encroaching population in agricultural areas. We can't really consider that isolation is always going to be there as a buffer against the population in general.

Dr. **MEYER**: I most certainly appreciate your bringing this to our attention. We will recess now for lunch and reconvene at 1:00 o'clock.

(Whereupon, the hearing recessed at 12:00 o'clock noon, to reconvene at 1:00 o'clock p.m. the same day.)

AFTERNOON SESSION 1:00 P.M.

Dr. **MEYER**: Our first speaker this afternoon will be Mr. Richard H. Lincoln of the Outboard Marine Corporation. Please proceed.

STATEMENT OF RICHARD LINCOLN, OUTBOARD MARINE CORP.

Mr. **LINCOLN**: I am Richard Lincoln, Manager of Environmental Engineering for Outboard Marine Corporation, Milwaukee, Wisconsin. We are manufacturers and marketers of snow vehicles, outboard motors, lawn and garden equipment, snowblowers, all terrain vehicles, chain saws and golf carts. Our products are in the pan and are used in many of the leisure time activities of Americans.

We believe in our corporation that criticism attributed to a product is frequently related to annoyance, caused by noise the product generates. It follows, logically that if noise levels are lowered, fewer people will be annoyed.

Our experience tells us that some people are annoyed by some noises under some conditions. Some of these people are demanding that legislators step in and control noise sources.

The extent to which the regulation of noise will help to reduce annoyance and contribute to the improved quality of life that we all work toward, is our concern. This is a complex subject, and it will be pointed out that noise reduction is not as simple as adding or enlarging exhaust mufflers, or building better enclosures. Time, talent and money are required to do detailed technical analysis of each product. Practical, effective attenuation means must be found for each separate noise source within each product.

The subject of leisure time noise, or more accurately—leisure time quiet—appeals to everyone's visions of relaxed, peaceful enjoyment, free of annoyance from loud machinery. When all facets of the problem are studied, the primary question becomes that of what to do about the apparent stumbling blocks that seem to prevent us from achieving quieter leisure surroundings, this presentation, hopefully, will make a contribution to the office of noise abatement and control in three pertinent areas: 1, present levels of leisure time product noise will be shown and discussed; 2, technology's potential ability to quiet some products will be projected; 3, complexities will be pointed out and pitfalls described in a positive manner so that many of them can be minimized or avoided.

I have a few slides I'd like to show you. The first slide represents the range in dBA on the scale at 50 feet of a cross-section of push-type rotary lawn mowers that are on the market today. Some of these are outboard marines some of them are manufactured by our competitors. The little red box over on the left about half-way up the scale represents roughly this range. You have a copy of this slide in your presentation here. The horizontal black line that you see going across the page from there represents graphically what the National Industrial Pollution Control Council suggested noise level goals are and they are platted against time. Notice that by 1983 they suggest that the maximum allowable noise level of that kind of lawn mower would be, I think it is 63 decibels.

The next slide, which I have to find, is a similar chart on a slightly similar product which has no vehicle noise platted in the same manner. Included on this chart in addition to the 50 foot goals, described by NIPCC are the levels which have been called out in various legislative bodies across the country and these points are represented on here only if they are in fact law or regulation now. Notice that in Chicago and Minnesota the level of 86 dBA is the law now. In Chicago, Minnesota, Canada and New York State in 1972 that level goes by law to 82 dBA as in Chicago and New York State by law, vehicles will not be allowed to be sold if they exceed 73 decibels at 50 feet.

It is interesting to note that, in these and nearly all other cases, noise level goals suggested by the National Industrial Pollution Control Council are equal to or below the level of noise now being generated by the quietest models of today's products.

The next slide shows noise levels of typical outboard motors of various horsepowers. Again, NIPCC goals are represented by the horizontal line at 70 dBA's, 1983, I believe that's the goal. The Chicago goal is in effect now and doesn't change, that is at 76 dBA, I believe, as you can see. An interesting observation here that noise from outboard motors does follow horsepower to a degree but only very generally. There are some obvious exceptions. It will be interesting to discuss one of those exceptions just a little bit.

Our outboard 50-horsepower motor sticks out there as not following that curve. Let me tell you about the design goals that were a part of that motor's specification. Let me remind you that that motor, although it has been on the market for slightly over one year, has been on the drawing board for over 5 years. The design goals for that outboard were high power output, small, light weight, low cost, 2 cylinders. These design goals can, and in this case unfortunately, they did lead to higher noise levels. This means that we have work to do. We are not satisfied with that and obviously it will not satisfy the country's needs of today.

For the record, I would like to repeat that the Outboard Marine Corporation accepts the goals that NIPCC has suggested. We believe that they are realistic and technically feasible. They are tough and we are not sure, since we can't look at them through everyone else's laboratory that everyone else in the business has the technical ability to meet those goals. We think that the technical ability which we do not have, we can acquire on that schedule at a price. We will talk a little more about that.

I'd like to talk just a little bit more about the subject of boat noise. There exists an almost infinite number of combinations of boats and marine power plants. Each one of them has its own distinct noise characteristics. The manufacturers of drives, such as outboards or inboards, have essentially no control over boat or power plant application. Regulations dealing with boat noise must take these variables into account. We can control the noise levels of the power source itself, but when it is attached to a sounding board it is a different game.

Mr. Lechtenberg pointed out this morning in the case of lawn mower engines, such a thing and a similiar matter applies here. We do feel that technology is available now, which will permit some leisure time products to be made quieter now. I repeat, we also believe that technology can probably be developed by some manufacturers to achieve the noise levels recommended on the schedule suggested. However, many small manufacturers of some of these products do not necessarily have either the technology or the resources to develop it, to meet these reduced noise levels.

Because we are not sure at this time which design techniques will be employed to achieve the varying degrees of quietness, we can only estimate the increased costs. For the record, these new quieter products will, probably without exception, 1, weigh more; 2, be bigger and bulkier; 3, cost more. A very important thing that I haven't heard mentioned to you gentlemen and I want to emphasize it, they will be more difficult and expensive to service and maintain in their original factory-quiet condition. Complexities are being added when we add noise treatment with what we know today and how we know to go about it.

This means that technicians who work on our lawn mowers and our outboards are going to have to be more highly skilled and trained and equipped. We are adding machinery and it is going to be complex.

To attain quieter products we must be prepared to trade off to some degree, many of the design goals which have been achieved in response to market demands. Light weight, low cost, portability, ease of operation and use and simplicity of maintenance are design goals which should not be cast aside lightly. Recognizing that price increases will be inevitable, and will deprive some people of the use of the product—every time you increase the price you change the market, we must study the cost benefit curve in each case.

The next paragraph on my report I should have coordinated with Leo, because he quoted President Nixon verbatim, so I won't bore you with that.

The question of how much every purchaser is to be penalized to satisfy the complaints that appear to come from a very small number of users or bystanders becomes a pertinent one.

If the Environmental Protection Agency, at the conclusion of these hearings, recommends noise level regulations, Outboard Marine will support them, favoring federal preemption. However, we believe that state and local governments should be allowed to regulate usage restrictions. Since many complaints about noise stem from places or events that involve a concentration of products into small spaces or over a short time span, usage regulations can be expected to alleviate these problems. We see nothing wrong, for example, with regulating early morning lawn mowing and late night snow vehicle use.

A check of conservation departments in several of the snow belt states indicates that the reports of annoyance are almost completely centered in the suburban areas far enough away from central cities to contain enough open land or lakeshores which can and are being used by snowmobile enthusiasts. Many of these communities are meeting the problem through time zoning, forbidding the use of the machines after prescribed nighttime curfews. Few of the complaints received by snowmobile law administrators are coming from rural areas or rural communities where snowmobiling has become a way of life during the winter.

Two more aspects must be considered. Measurement of noise and the enforcement of regulations. Measurement of noise is in itself, as you well know, a complex subject. Precision equipment is required and must be maintained in perfect working order. Only skilled, technically trained people can be expected to record and interpret data correctly. An important point, often not adequately resolved, has to do with whether a product's noise level should be regulated at "maximum" levels. Many products are used infrequently under maximum noise conditions, so it may be fairer to rate them under more typical conditions of usage. Unfortunately, use-cycle data are scarce. Research is under way now on several of our products, as a great deal more knowledge is required before we can be sure that proposed regulations will be realistic and fair.

Because of complexities and the controversial nature of product noise measurement, outboard marine recommends that Environmental Protection Agen sponsor—jointly with industry—research that will establish acceptable use and measurement standards. Special emphasis must be placed on correlation of field usage data with factory certification data.

I'd like to expand on that a little bit more. We are not anxiously awaiting money from the government, that's not our primary purpose in participating. We believe that if we could co-sponsor the research as we are already doing with other departments of the Environmental Protection Agency, the test conditions are prescribed to mutual satisfaction and the results are creditable results and they are acceptable to the government and to the people, this is one of the main purposes of participating in such a thing.

Enforcement of noise regulations is a critical subject, with which we all have very limited experience. Until Chicago "put numbers" on product noise levels this year, there were very few areas that had leisure time product noise regulations in effect. Strict, fair and uniform enforcement codes are a must. Without them, manufacturers whose products do conform to regulations will suffer severe penalties. The engineering and marketing of products which conform will be expensive and manufacturers' competitive advantages can be lost easily if all noise regulations are not enforced uniformly. A complex task.

In summary, we have looked at noise levels of typical leisure time products and noted that technology can be probably developed which will possibly reduce complaints stemming from annoyance. These reductions will penalize the product user in cost, weight, bulk, ease of handling and simplicity of service.

Regulations and standards can be established which will be realistic and feasible, but there are many complexities to be considered if fair and equitable enforcement is to be maintained.

Since many complaints about noise are from members of small, special interest groups, great care must be taken to assure that large numbers of people are not penalized to satisfy a few.

In conclusion, I hope you will agree that federal regulation of leisure time product noise, although it can be effective in reducing annoyance in some cases, will be complex and difficult to enforce uniformly and will impose considerable penalties on many people to satisfy a limited number of special interest complaints.

Dr. Meyer: Before making a comment, I would start off on the left—

Mr. Lincoln: Excuse me, I just found another page.

Dr. Meyer: In that case, before Dr. Fletcher directs his words to you, kindly continue.

Mr. Lincoln: It is sincerely hoped that the Environmental Protection Agency will carefully consider every facet of this complex problem before establishing standards and regulations and will join with industry in research to ensure that fair standards and procedures are set up for the regulation and enforcement. If there is any way in which Outboard Marine can continue to be of assistance, we will be most happy to oblige. Thank you, now I am through.

Dr. Fletcher: I think it is refreshing to have one with your candor get up here and state your industry's position or company's position. I am very happy to see that. I think in all good conscience, I would like to point out at least two facets here. The problem of a nuisance differs from that of a health hazard and there are some different approaches which could be used, depending upon which of the 2 you were emphasizing. And obviously, I think the first priority of research and effort certainly should go toward the health hazards and I see it from the data again, certainly some of these products could pose a significant hazard to hearing at the present level. But I think that engineering-wise I would like to point out to you the possibility of some consideration being given to the fact that an annoyance has certain characteristics to human beings, which perhaps you could utilize in your engineering approach. And, even if you don't change the actual sound levels themselves, you can change their annoyance to humans and frequently we have found that once engineers have got to the stage where the costs of further engineering advances are prohibitive that frequently by considering the ultimate recipient, the human, we can make advances at a cost other than in direct engineering. I would want to point out that possibility to you and hope you would consider it.

Mr. LINCOLN: Yes sir, thank you. I think basically this may be an over-simplification, which is always dangerous for the nation. Many of the factors of noise, I believe, are in the high frequency area and those fortunately are somewhat simpler and easier and sometimes less expensive to deal with than the low frequency noises. So, yes sir, thank you, we are aware of that.

Mr. BOTSFORD: I don't know if you meant to imply, but a small number of complaints doesn't mean a small amount of annoyance. People are reluctant to complain, especially against their neighbors, so I think that probably you ought to multiply that by a scale factor of 2 or 3, at least, to make an appropriate appraisal of the noise.

Dr. MEYER: I was going to make some comments on that myself. I'm glad you said it.

Mr. LINCOLN: I'd like to say, if I may, that our company—I didn't make that clear enough in my talk. So, maybe the casual word will be more clear. Our company is quite aware that we are annoying some of our customers and I can tell you from having sat in many of the top management meetings and although I am not top management, our policies, our company's policies are, and they are being worked on, that we will blank well, reduce the annoyance levels of our products to the point where they will hopefully discontinue annoying people. If anyone is annoyed by snowmobiles they are not going to go down town and buy a snowmobile. It's that simple. We are selfish and we want to sell snowmobiles, so if we continue to annoy people, we are destroying a part of our own market, which can't be anything but stupid to do. So, we do not underestimate the importance of the few people who did complain, but we are trying to reduce the annoyance level in our product line.

Mr. STRUNK: That is some of the information that I'd like to have. You expanded on—we have heard testimony yesterday in particular, about the fact that recreational vehicles cannot sell quiet, that we have to have regulations to establish limits, otherwise the companies will not, on their own initiative, reduce the noise level of their equipment. Now we all recognize that Outboard Marine has been working on noise reduction for many years and have made some real accomplishments in the field and I wonder if you would respond about what pressures forced you to do this. Were they a desire to reduce the overall noise level of the equipment? Did you feel there were sales of your customers were bringing these pressures to bear, or did you feel that future legislation may force you to reduce the noise level?

Mr. LINCOLN: I think you have just answered the question for me. We feel all those pressures. It may sound mush-mouthed, but we do believe that under some conditions quiet can be a sales future. We feel certainly this was demonstrated in the case of the outboard motor. We led the world into quiet outboard motors and the other companies, our competitors, have followed us there. We have further progress to make, obviously. In the case of lawn mowers, I will talk out of the other side of my mouth. We introduced in the 1950's a lawn mower, which was, I could be tripped on this now because my memory is not that great. I think it was quieter than anything that even NIPCC recommends for 1983, and it fell flat on its face. It did not sell. The people didn't want it. So, the other side of that coin is that sometimes the quiet products don't sell.

Mr. Strunk: You feel the market may have changed and the quiet lawn mowers would be more desirable now?

Mr. Lincoln: Yes.

Mr. Strunk: The other point was, you made, was that you people have the capability in-house to at least develop the technology to meet the goals that can be set, but some of your competitors cannot do this. Could you expand on that a little bit and indicate how technology might be transferred in the industry. Is there an interchange or is this proprietory or is it something that needs to be done on specific products? Can you give us an answer?

Mr. Lincoln: There is interchange through the industry associations, like SAE and others where we do publish information. Usually, I believe everybody's practice, if not policy, is to not publish until you have got something into production. So, in part, I think I am answering. There certainly is proprietory information, we know things now that we'd rather not disclose to the general world because we want to make a competitive advantage out of it.

There have been cases and we demonstrated this in the case of water pollution, as recently as January of this year where we, because our company happens to feel very strongly that we must have clean water. We had some patents and some inventions, some engineering ingenuity, which helped clean up the water. We announced this to the world and we announced at the same time that we will share that technology with anyone who asks for it and this is a matter of record.

Some technology I'm positive could be shared. Some of it can just plain be copied, as you well know, and some of it, of course, can be purchased. On specific products with a specific problem, companies like your own can be hired to study that problem and come up with solutions for individual companies. I don't know if I have answered your question.

Mr. Strunk: Yes you have, thank you.

Mr. Norton: Mr. Lincoln, I think you raised a very good point in your statement here concerning difficulties and expenses in servicing and maintaining equipment in factory quiet condition. And, as you yourself point out, this really hasn't been brought up in the last two days of hearings. It is a very important question because obviously we can put a great deal of time and effort and money in creating a product as it comes off the shelf that is very quiet. But, it may deteriorate in a few month's time to an unacceptable product. What is your feeling about the state of the art of technology to create products that do have a lasting quiet quality to them? Are we capable of doing this and are we capable of maintaining them in this consistently quiet condition?

Mr. Lincoln: Well, I would have to answer yes, we are capable, but we must face an additional set of problems and it will involve training and education of dealers and technicians, who normally work on products. It should involve also some owner or user education because a man can help himself to a certain degree by recognizing when things go wrong and I confess I would be the last to propose that regulations should require a 50,000 mile check as they do in automobiles. But, I don't know, if you are going to regulate you might as well go all the way. So this can be considered in the design of the product, is my point. That we who design might take that into consideration just as you would for regulating.

I might add, I think I did a poor job of reading my speech. I think I left out an important part of that and it has to do with our feelings about the possible increased cost that might result from these products. Did I cover that?

Dr. Meyer: Yes, you did.

Mr. Lincoln: This is related, of course, to the "life" as well as it is to the original noise level.

Mr. Norton: Right, that's related to my next question to some degree. You make the statement on page 5, "The question of how much every purchaser is to be penalized to satisfy the complaints that appear to come from a very small number of users or bystanders—" and later on you again allude to this attitude that great care must be taken to insure that the large number of people are not penalized to satisfy a few. It has been my assumption that basically human rights are not necessarily subject to the whim of any populace. There are some inalienable rights and freedoms, among them perhaps the freedom or right to live in a clean, unpolluted environment. I wonder if you are really alluding to the fact that perhaps some people should allow themselves to be subjected to pollution problems, noise pollution among them, with no recourse? I don't think that is what you intended, but this seems to come across in your statement a few times.

With regard to the relative numbers, I might point out that you are talking about large numbers of people not being penalized to satisfy a few. But, that's a relative term, because certainly what you call large numbers of people in prospective of your total society, the number of people who own some of these lesser products are a minority. Not everyone owns an outboard motor or a snowmobile. I wonder if you had any comment on that particular point about the relative numbers?

Mr. Lincoln: No, I don't think I have any particular answer to that. I simply was trying to point out our feeling that the regulating authorities and the agencies in our country have to weigh that. It doesn't mean that they ignore the people who complain, but I think it is necessary that the weighting of a large number of the minority be considered.

Mr. Norton: I have one more question. At the very beginning, you make the comment that time, talent and money are required to do detailed technical analyses of any product, referring to the kind of work that must be done to have environmental satisfying products. What percentage of time, talent and money, what part of your company's time, talent and money is devoted to this sort of thing, to research and to the noise control problem, for example? Do you have some figures on that?

Mr. Lincoln: Yes. Incidentally, these figures have been reported to your office at your request, Dr. Meyer, so they are a part of your records. Yes, I dug back and looked things up as accurately as I could and it sums up this way. Up through 1970, fiscal 1970, Outboard Marine spent approximately $504,000 in engineering and capital equipment and in research for noise reduction study and work. That figure does not include tools or dies or anything else which we purchased in order to put noise reduction or the treatment of noise into production. Strictly engineering and research.

Our budget this year, throughout the corporation for the same thing, engineering and research, is approximately $625,000. There are about 26 people, this varies from time to time, but about 26 people full time on that type of work.

Next year, our divisions and our central research estimate that the total budget will be about $950,000 a year and there will be 42 or more people involved in our corporation. We expect that $950,000 figure to remain and increase slightly during the next 5 to 10 years.

Mr. Norton: Could you, could I ask if you have any idea how that compares with your advertising budget?

Mr. Lincoln: Yes, you could ask that. I can't answer it.

Dr. Meyer: That's a candid reply.

Mr. Lincoln: I would answer it this way. I think that is totally and absolutely unrelated to our advertising budget or any other budgets, so I truthfully on my Boy Scout's honor, do not know what our advertising budget is. I should, but I don't.

Mr. Norton: Well, the reason that I asked it, I do have a valid reason for trying to explore that. That is for example, you make the comment that to obtain quieter products we must be prepared to trade off, to some degree, many of the design goals which have been achieved in response to market demand.

Now, it seems to me that, you know, in recognizing the real world that we live in the law of supply and demand just doesn't work any more. It is not, at least not since the advent of Madison Avenue. I think a lot of people recognize there is a great deal of influence that Madison Avenue has on volume and buying patterns of a public. This is why I tried to bring out, I am trying to explore a point earlier mentioned of can the quiet product be sold and if so, how much effort is being made in this regard.

You pointed out that an earlier model of lawn mower did not sell because it was quiet. Apparently it was quiet or for whatever reason and earlier in this hearing there has been reference to the psychological affect of products that we have instilled in society, perhaps noisier products somehow gives us a feeling of power. I think this is related to Madison Avenue technique, more or less, in an effort to sell products to people.

Mr. Lincoln: It may be related, I really don't know. I can tell you the other side of the coin. We have never, to my knowledge, ever advertised or probably would never consider ever advertising our products as being powerful because they are noisy.

Mr. Norton: I am not trying to imply that. Again, let me state I am trying to get at the idea we talked a little bit about here, about can we sell a quiet product. Can we make the public believe it is a socially responsible thing to buy a product that is more quiet?

Dr. MEYER: My guess, as I sat listening to Mr. Norton, it occurred to me, is that I can invision an advertisement in say, motorboat sales, "Outboard Marine's 270 horsepower may be a little bit bigger than last year's model, but listen to how quiet it is." Will that help sell, isn't that what you are driving at? Can we merchandise the fact that even though it may be a little bigger, can we at the same time sell the idea that it is quieter?

Mr. LINCOLN: I personally feel that quiet is a sales future. I don't know if I speak for my company when I say that, or not.

Dr. MEYER: I was just wondering.

Mr. BOTSFORD: Do you know if quiet is mentioned in your advertising?

Mr. LINCOLN: Yes sir, it is.

Mr. BOTSFORD: That sort of regains you marbles on the ratio of noise control to advertising.

Dr. MEYER: As a matter of fact, I have seen their ads and they do. Could I raise a couple of points with you, not necessarily questions, but first I want to compliment you for being candid. It certainly would appear that your industry is really investing a surprising amount of effort and dollars. I'd like to come back to what Mr. Norton was saying, that it is a little difficult to really assess complaints in terms of "small groups." I think that, and I know that you realize that those groups are made up of individuals and sometimes they are not just groups. They are individual citizens, who for a variety of reasons, differ in attitude and understanding and have valid complaints. And those groups may be, as has been pointed out, the tip of the iceberg.

A lot of people feel that that's characteristic of progress, so we have to put up with it, but I don't like it. They don't get motivated to regulate except when the problem becomes unbearable, such as the airplane noise problem. As you have been aware, there has been a great deal of discussion about the validity of some of the measures of annoyance from aircraft and perhaps they are based on curves and studies and analyses of subjective responses done 15 and 20 years ago in contradistinction as to how today's society looks upon these problems. And those people would have responded, yes sir, this noise bothers me but I don't feel I will make a complaint. But today, those same people would say, this noise bothers me and I would make a complaint and those who said maybe 10 years ago, it bothers me and I will make a complaint, will now say, it not only bothers me but I have made a strong complaint.

What I don't like is the inference that it was only a few people here that you really have to spend a great deal of effort on and I don't think that's the case.

Mr. LINCOLN: I don't think it is the case either. There are, and we feel a great deal of pressure from these people within our organization. There are some small special interest groups who will attack and try to cause products to be absolutely eliminated, not only our product, for their own benefit. And we have them and they will be in a small association within a city, maybe people who live around a lake. They will get petitions and they will do all sorts of things to specifically exclude everything except themselves, you see. They want to continue to be there and that's certainly their privilege. But they want to exclude everything else and our only point in saying this is that this is a government regulating body and I think you must weigh that.

Dr. MEYER: We have to weigh all sides. We are going to listen to the citizens, to industry and then we will come up with not only meaningful, effective and reasonable regulations, but also effective standards as well.

Mr. LINCOLN: That, we absolutely expect and hope for, of course.

Dr. MEYER: I think the suggestion that we get together with other federal agencies and with industry on establishing this very difficult use and measurement standard is a very worthwhile suggestion. It has been felt through all the hearing that there is a real need for this. Dr. Fletcher has a comment he wants to make and then we will move forward.

Dr. FLETCHER: I am increasingly becoming aware of a situation which I think is important and has been revealed and that is that assuming that Environmental Protection Agency and the relevant government agencies, with reasonable, and reasonable from both standpoints, criteria for the emissions of various types of sound sources, that the usage regulations probably hold forth the greatest hope for the solution of this problem. That assuming we protect the health and make some reasonable advances toward reducing annoyances, then the usage regulations appear to provide the rest of the impetus and push toward better quality environment.

Mr. LINCOLN: It appears that that has merit, certainly, yes sir.

Dr. MEYER: Before you go, I would like to ask what is perhaps a rhetorical question and that is, the point has been made about the maintenance of "life". What's the feasibility of including in the manufacturer's handbooks and technical data books, both for the serviceman, and for the user, some cautions and instructions and also some caveats about the noise production and warnings as to the need for sticking to tolerances and so on?

Mr. LINCOLN: Totally feasible. I see no reason why it should not be included in owner's manuals and so forth and certainly it is included in our service literature and we include it in our service training centers, which we own and operate and this can be expanded, certainly.

Dr. MEYER: Thank you very much sir. At this point I would ask that Mr. Roger Ringham and Mr. R. T. Bennett, his associate, come forward.

STATEMENT OF ROGER RINGHAM, INTERNATIONAL HARVESTER

Mr. RINGHAM: I am Roger Ringham, Vice President, Engineering, International Harvester Company.

The International Harvester Company is a multi-divisional organization wherein each division operates relatively autonomously to design, develop, manufacture, market and support its particular product lines. Our Farm Equipment Division is responsible not only for farm equipment, but also for lawn and garden equipment. It also produces the light industrial products which were included in our earlier presentation at Atlanta, Georgia.

As with our other products, we have in recent times been evaluating our lawn and garden and farm equipment sound levels in terms of measurements 50 feet from the machine. The machines are operated at the maximum loading for the particular vocational application being considered. This environmental sound level (or ESL) is measured with the "A" weighting network in decibels and is designated dBA.

Our presentation is organized on an ascending scale, starting with the small walk-behind lawn mowers and progressing up through the large diesel tractors and combine-type harvesting machines.

With that brief notation of what it is, we will let the expert present the material.

STATEMENT OF R. T. BENNETT, INTERNATIONAL HARVESTER

Mr. BENNETT: Maybe we will have a chance to look at some of these machines. We will have a chance to look at some of these machines while we are talking about them. We will start off with our lawn and garden equipment which is characterized by a single cylinder air cooled engine and relatively few hours of weekly operation. Our smallest equipment is walk-behind lawn mowers that you see now. Typically ESL measured at 50 feet during mowing operations is 66 dBA.

The next class of equipment is the riding lawn mower (Figure 2). ESL during mowing runs about 70 dBA, but it's interesting to note that the 50 feet ESL on a paved area with the mower blade running full speed is about 76 dBA. The grass helps quiet things down significantly.

Our lawn and garden tractors make up the balance of lawn and garden equipment (Figure 3). Most of these tractors are sold with a rotary mower, and ESL mowing grass runs 76 dBA-78 dBA.

It is interesting to note that much of the noise of mowing with a rotary mower, whether a large highway mower or a small lawn mower, is the mower itself, not the engine powering it. It is, after all, just a sort of a fan, and the blade tip speed is in the neighborhood of 200 miles per hour. It makes a noise when you push something through the air that fast. If the blade is going much too slow, of course, the mower won't cut. If it's going a little too slow the mower will plug with grass clippings or leave them in a windrow instead of uniformly scattering them.

Farm equipment is typically powered by four, six, or sometimes eight cylinder engines, usually water cooled. It may be self-propelled, i.e., have its own engine and drive mechanism, or it may be attached to a tractor which also powers it.

Typical of self-propelled equipment is the combine (Figure 4), which gathers and cleans grain, and loads it into a truck or wagon. With all its harvesting mechanism operating, a typical combine standing in an unpaved lot has an ESL of 88 dBA.

Other self-propelled machines include sprayers, windrowers and cotton pickers. I wouldn't expect any of these to have higher sound level than the combine.

Other farm equipment includes tractors and implements. These tractors cover a power range from 30 hp to 140 hp and have maximum ESL values from about 80 dBA to 90 dBA, with most between 83 dBA and 88 dBA. Tractors do not always operate at full load, of course, so when loads are less than maximum, the sound levels are usually lower.

As a matter of information, we find that gasoline powered tractors usually run 3 to 4 dBA quieter than diesel tractors when at full power. Diesel power, on the other hand, results in lower operating costs so the challenge is in balancing economics with desired goals.

Many implements such as planters and cultivators do not load the tractor to full power. Consequently the noise level is much reduced. For example, a typical cultivator-tractor combination (Figure 5) measured 81-82 dBA at full working speed. The same tractor under full load with a plow measured 86 dBA. In another case, a tractor pulling a planter (Figure 6) was found to have a maximum ESL of 75 dBA. The same tractor under full load tillage operation would be about 84 dBA.

Mechanical limitations presently determine the size of mowing equipment (Figure 7) and ESL of these machines in combination with tractors ranges from 71 to 79 dBA. I would expect these mechanical limitations to the size of mowing machines to continue to keep them among the less noisy agricultural machines.

Many tillage tools such as plows (Figure 8) and disc harrows require full tractor power and although they make negligible noise themselves, when they are being used the ESL will be at the maximum for the tractor, usually 83 dBA to 88 dBA.

Equipment used around the farmstead presents a measurement problem, because of the proximity of buildings. While the readings we get are real, they are as much a function of the site as of the machinery running. At our experimental facility near Hinsdale, Illinois, we measured a silo-filling operation using a blower and a self-unloading wagon, each powered by its own tractor (Figure 9). The silo is next to a large metal building, fairly typical of farm layouts. We were able to measure the ESL to the front and rear of the tractor, and on the side away from the building. Our readings varied from 76 dBA to 85 dBA depending upon location. I'm sure we would have different results if we could generate and measure the same sound in the middle of an open area, but that's not where this equipment is used.

Forage harvesters (Figure 10) are high-power-requirement machines, causing full tractor noise and are a noise source themselves as well. The ESL for these machines in combination with the tractor powering them runs around 86 dBA to 88 dBA. These values were measured on the side of the tractor away from the forage harvester, and the readings might be higher on the other side, but that's where the crop is still standing, and there shouldn't be any human exposure. Also, I would expect the crop to muffle the sound.

As a matter of fact, there is little exposure to most agricultural machinery on the part of anyone except the operator. There are several reasons for this. First in the fact that most agricultural operations occur in relatively uninhabited areas, and they seldom attract casual observers. Secondly, these operations are seasonal and mobile. Even if one lives next to a cultivated field, it only gets plowed probably one day a year, and even then only one pass is next to the house, all the others are farther away and therefore quieter. It probably gets disced once, and then all other operations such as planting and cultivating are relatively quiet until harvest day, with again only one pass through the field next to the house.

Operations which take place in more inhabited areas are also intermittent and generally lower in ESL than many other things in the same area. A tractor with a rotary cutter of the type used for highway roadside maintenance, (Figure 11) was measured at 76 dBA. The trucks using the highway are not much better than 88 dBA. As our Truck Division has previously testified, they can be lowered to about 86 dBA in the reasonably near future, but anything significantly lower than that will require extensive engine development.

It is this line of reasoning that has led us to concentrate our efforts over the last several years on reduction of noise at the operator's station. Of course, much of our work has resulted in improvements in ESL, even though that wasn't our primary purpose. The literature indicates that our industry in the last few years has doubled the power available to the farmer from his tractor while keeping the noise level the same. Benefits to the environmental sound level of the increased power include having fewer tractors running to do the work and finishing it sooner. Other agricultural engineering contributions to lessened environmental noise include improved machines and farming practices resulting in fewer trips through the field to raise a crop.

International Harvester farm equipment engineers have been concerned with sound and have been making sound measurements for at least 20 years. We and our suppliers are continuing to work toward quieter machines without requiring our customers to use less effective mechanical products, with attendant cost increases for the farm products of food and fiber.

One sound control job we have done illustrates the biggest problem in quieting complex machinery; namely that with multiple noise sources, you must quiet them all to get much improvement. Figure 12 summarizes the program. We designed a tractor with a rather quiet fan and engine, but a noisy transmission, as shown by the dotted lines. This was a new type of transmission and it had many attractive features and greatly improved the productivity of the farmer. So we set out to make it quieter and we did a pretty good job, as shown by the solid lines. We reduced transmission noise by 3 dBA. But we only quieted the tractor by 1 dBA.

I think while we are looking at this slide, there are a few other things that we can say about it. First of all, I'd like to do what I can to lay to rest this muffler business. At least as it applies to our farm equipment as being a source of significant improvement in noise level. The product that we are talking about here and which I have just furnished you with sound information for our products on which we have already done considerable sound control engineering work. We have essentially removed the engine, including exhaust and the muffler aspect of it specifically and other aspects as well.

We have removed the engine as a significant contributor to the overall noise and we have removed the fan even further from being a significant contributor. We could make decreased in the fan and the engine further, but decreases in the fan and engine are not going to improve the overall problem, but the other things which are significant are that we have already made considerable improvements in these elements.

This work, at least in our machines, has been done and we are not starting from the beginning now. We started this a long time ago, as I guess Mr. Ramp, among other people has testified and maybe some of the people who follow me will again demonstrate.

We have considered the possibility of reducing sound levels by soft mounting the engine and transmission. The amount of reduction at 50 feet appears to give only marginal improvement. Tractor design has grown from the need to keep a compact, narrow vehicle to provide versatility for mounting implements, good visibility, and row crop considerations. Thus the engine and transmission have become the integral structure for the vehicle. Strength considerations make for heavy housings that in turn tend to suppress sound amplification. It would appear that little improvement would be obtained by soft mounting the power train unit.

Going to a separate frame concept for all our tractors would mean starting in the engineering department with a clean piece of paper. For our industry, this would mean millions of dollars in engineering expense and perhaps hundreds of millions for new manufacturing facilities. All this money must eventually come from the price we pay for food and clothing, with a doubtful improvement in ambient noise.

Agricultural machines are used only a few hours per year, about 600 hours average for a tractor. They are not usually concentrated in one area and there are generally few people nearby. Environmental sound levels are generally well below the danger point for hearing loss and their intermittent and infrequent nature minimize their environmental impact. Nevertheless, should regulation of environmental noise from agricultural machinery be deemed necessary, I would like to make two recommendations. First, the operator should have to meet no lower limit than the manufacturer had to meet when the equipment was made. In general, there is no way to retrofit to make older tractors more quiet, with the rare exception of a tractor originally built without an exhaust muffler. This is already apparent to us from our sound control work at International Harvester. Although these older tractors will be around a long time, they will be used less every year, reducing their contribution to environmental noise.

This seems to be a pattern of machinery ownership in our industry in that tractors do not get used extensively, worn out and scrapped in a relatively short time. They are used less and less frequently. The newer tractor gets the most use because it has more power, more productivity, more convenience features for the operator and the older tractor gets, so to speak, put out to pasture, but not disposed of really.

Secondly, for maximum benefit at minimum cost, I feel that federal regulations must be preemptive, to preclude a proliferation of local rules covering the source of the machine itself and of course, still leaving open the local option of regulating usage. But the source noise itself, maximum noise capability of which the machine is permitted to have should be preemptive.

I would like to close by talking about three sources of sound level data the panel might like to review. The first of these is this SAE, R-4 publication, which has already been put into the record yesterday by Mr. Ramp. And I believe it was put in again today by Mr. Sparks and I don't believe I will compound that. And, as far as that's concerned, we put it into the record at Atlanta, at the hearings there and I don't believe we will put it in again at this time. But I would like to emphasize one aspect of this report that I think is important to us or our main consideration here and that is the nature of the noise exposure now that is certainly a long ways from a definitive treatment of the nature of agricultural noise exposure. But it attacks the problem rather well. It defines the problem at least and I submit that the environmental sound exposure for any one person or any one area is a sub-set of the exposure of the operator, which this report deals with. And so from the standpoint of discussing the nature of the agricultural noise exposure circulation, I would like to invite your attention to this document.

I also refer to the noise test results from the University of Nebraska, which were included in the booklet yesterday. There was a summary of the results published in a magazine that I have appended to the printed copy of my presentation as the last page. (see above reference)

Mr. MEYER: It will be incorporated in the record.

Mr. BENNETT: The 1971 tests are not yet complete but I will imagine that when they are complete, you will probably be interested in getting these results from the University of Nebraska. The other source of information on tractor noise levels is the Organization for Economic Cooperation and Development. The ESL at 7½ meters is included in their tractor test reports, which are available in this country from OECD Publications Center in Washington, D.C., the address of which is in the printed form.

The University of Nebraska environmental sound data and the OECD data are taken from 7½ meters, rather than 50 feet, but if you will subtract 4 or 5 dB from the figures they should be a good approximation of the values to be obtained at 50 feet and while we are at that point there is another thing I would like to talk about and that is this distance business, since it has been brought up earlier.

In the case of lawn mowers and small sound emitting devices of that same general size range, this 7½ meters or 24-foot distance range, 25 feet, may very well be a good distance at which to take sound readings. There are some advantages to moving up closer in that it minimizes the effect of background noise, wind noise and so forth by raising the level of the noise that you are trying to measure. But, on larger machines, such as a lot of our farm equipment, certainly our trucks, 25 feet just is not far enough away and I think that this was discussed, to some extent, in the hearings in San Francisco earlier this week. But, since I have not yet heard anybody put in a plug for 50 feet, I thought that I would like to do so at this time because I don't believe that it would be a good idea to go across the board with a 25 foot or 7½ meter measuring distance standard. Because I just don't think that's a sound, technical approach, at least for the larger sound source vehicles.

Dr. Meyer: Thank you very much. Your last comment is of course, also very germane to the larger subject for which we have overall responsibility. Mr. Ringham presented information on some techniques with which your company has been working. This is a complex subject and obviously this agency and the other agencies are going to have to come together to see if we can establish a national uniform system for measurements. Any questions from the panel, starting at the left?

Dr. Berry: The first one is to inquire about the amount of coordination within your operations, because I would suspect that a Blooming Mill at Wisconsin Steel would be a pretty noisy operation and that under OSHA there would have to be some talent directed at reducing the noise level there. Would those people be working with your people at Hinsdale in the overall problem of noise reduction?

Mr. Ringham: I'd like to address myself to that question. You are right, that's a very real problem. It is a little difficult to directly relate Blooming Mill products with our products because the phenomenas are quite different. Nevertheless, the basic noise measurements, at least, are intercommunicated. For your interest, we affected a number of different things and more recently we have established in the engineering organizations of each of the divisions in our corporation research center, technical steering committees that set up working groups as appropriate to solve problems or to bring talent together to solve problems. We do all we can.

We are, in fact, trying to pool our resources. No question about it and particularly in the rapidly growing field of ecology controls where there just isn't such a thing as an exhaust emissions engineering degree. There are some specialists to be sure, trained, in acoustics, but they are limited, particularly those that have not only physical acoustical ability, but the engineering smarts to go with it. Yes, we do have to pool our resources and we are doing everything we can in that regard. That was a good leading question.

Dr. Berry: The second has to do with pressure, which might be coming from international operations. I gather that you do have international operations, from Europe you would have had pressure from roll bars, are you being requested, coerced, forced to meet any noise levels for overseas sales that aren't involved in the United States?

Mr. Ringham: We have a growing activity in, yes sir, and communications in this regard. Here again, in our research center, we provide a centralized service which is trying to pull together all the different world-wide requirements and attempting to rationalize them. We are also, if you please, that the United States Government's support of our U. S. agencies and the international standards operations will help considerably to bring the weight of the United States to bear here. But if you bring—this is another very good leading question for me, in that in the field of international economics and Lord, we could use help in the balance of payments, the United States needs to take leadership internationally in trying to assert some of the things to whatever extent we can.

Dr. **Berry**: Are there any countries, to your knowledge, which have more rigorous standards that you are able to meet for vehicles sold domestically in the United States?

Mr. **Ringham**: I think I'd have to answer yes and no. It is a varying thing. Right now, as I recall, we are having a little bit of a tussle trying to get a couple of things made happy for Sweden, with a combination of overturn production and vehicle noise sources and the reflection of the thing—we have a problem or two where we had to skizzel into some monetary requirements, but these things are variable. And it is not really what you are asking. What you are asking is are we setting the pace or dragging behind. I think it is a rolling target that varies back and forth.

Mr. **Botsford**: In discussing Figure 12, which dealt with quieting of the transmission in a small amount of total noise reduction, you testified you reduced the transmission 3 dBA, the chart shows 2. Is that a typographical error?

Mr. **Ringham**: There is.

Mr. **Bennett**: That should be 85½ and I have looked at it more than once since it was typed, without having noticed that. If there is someway that we can have that appear in the record, the transmission sound level shown by the solid bar should be 85½ dBA instead of 86, as printed.

Dr. **Meyer**: That will be noted.

Mr. **Botsford**: The other question I have is, do you approve of the noise limits for leisure time products recommended by the National Industrial Pollution Control Council?

Mr. **Bennett**: I had not seen those before today, and I guess before yesterday actually and I'm not well informed on their exact limits, right to the last dBA and I'm not at this point now, speaking for International Harvester, Mr. Ringham may choose to do so. But from what I have seen on slides and from what I know about it, I am in general agreement, at least with, certainly with the purpose and in general, with the levels. The riding lawn mower was not too far out of reach. The walk-behind lawn mower was 66 dBA, which I think is within the current recommended—I think that sits well for this point in time for those standards and so I am in general agreement with those goals, but I have not studied them, unfortunately, and I am not in a position to make a statement committing the company. But I will make the statement, as a citizen, as a reasonably well-informed technical person.

Mr. **Ringham**: I would observe that I presume that the recommendations relating to the work machine, you know there is quite a difference between setting the machine on the concrete and having to work—

Mr. Botsford: These don't apply to large farm tractors. They may—

Mr. Ringham: I was speaking of the lawn mowers.

Mr. Botsford: It is the SAE test procedure.

Mr. Ringham: I believe that's right.

Mr. Botsford: The reason I asked that question is this, a recommendation from industrial executives of this general industry of which you are a part, and I'd like to know if the industry supports it. I asked the gentleman from Briggs-Stratton this morning that question and perhaps a little unfairly because they make the engine and not the vehicle and I think it would be very helpful if we know how International felt about these numbers.

Mr. Ringham: We will have to reserve reply and send it to you in the mail.

Dr. Meyer: Okay, fine.

Mr. Botsford: I wanted to inquire about the motor noise where, as you indicate, it is primarily blade limited, where you have very high type speed velocity. I wonder if you could give us some insight as to what the cost differential might be in having a reel-type powered, which we don't see around a whole lot any more and I wonder if you could give us an indication of the cost differential between these 2 types of motors, whereas, the reel-type may be quieter than the rotary.

Mr. Bennett: I am not aware of any cost studies that International Harvester has made on this area. In my position in test and the development, the best and development department, I would not normally come in contact with this. I am sort of a hardware type myself. Now, if you would let me speak from observation again, as a citizen, with a technical background, I am aware of the price differential being charged now by people who make both kinds. And in general, if we are talking somewhere in the home-type individual owner, 26-inch category, you will find that reel-type motors are available. They tend to run in the neighborhood of $125-$175, actually $125 would be a little low. They would tend to run $150 to $200. They, as far as I am aware, they are all self-propelled, so now they would compare with self-propelled walk-behind lawn mowers, which start instead at $150, start somewhere in the $100 category and go up to the, oh, say go up to perhaps $150 or maybe $175.

(The following is the comment requested from International Harvester Company.)

Comment was requested on an NIPCC document dated May, 1971 on the subject of "Leisuretime Product Noise" prepared by the Subcouncil on Leisure of the NIPCC. With regard to schedule A of the report, we cannot concur with extending product noise level predictions to the year 1983.

It is our conviction that extrapolation of technology to specific numbers for that time period is unrealistic. It might be appropriate to identify 1983 values as broad goals, but not as feasible goals. Without the risky assumption of major inventions, we cannot predict attainability of these values, to say nothing of the feasibility which would imply economic as well as technological capability. Since only the rotary power and riding mowers of the several products in Schedule A are in our product lines, our comments in terms of specific numbers are restricted to those products only. However, we feel our comments regarding predictability of general technology to 1983 are pertinent across all of the product lines.

The ANSI test procedure referenced in Schedule B is only a draft procedure, not generally available. We have requested a copy of this procedure from ANSI, but since we have yet to receive it we can only assume that this draft is consistent with the SAE test procedure cited for other appications. Our preceeding are based on this assumption. We wish further to note that after checking informally with several elements of industry involved with the product lines of Schedule A, we find it does not represent industry consensus in that none of those we contacted participated in the development of Schedule A.

With reference to the general subject of feasible product noise levels for the future, we are developing as carefully and realistically as we can, projections for our products. These will be in our presentation at the EPA hearings to be conducted in Washington, D.C. November 9-12 on the subject of "Technology and Economics of Noise Control:"

Of course, you could add a lot of things, you could add an electrical start attachment, so I would say that it would take you approximately from the $100 starting point category up to about $150 and they would be quieter and you have got several things going for you. Well, you have got 2 things that I can think of now.

One is that the shearing action of the reel-type mower is quieter than the fly, or whatever action of the rotary mower and the amount of air and speed involved is intrinsically a quieter process.

The other thing you have going for you is considerably reduced power requirements, I believe. Because the engines, I think, tend to run on the 2-horsepower category for the reel-type mowers and they tend to run in the 4-horsepower category for rotary motors of about the same size. And so, if you cut your power requirements of your prime mover in half, you make a reduction in noise there as well as the reduction of noise you get by getting rid of fast motion rotary blades.

Mr. BOTSFORD: I might mention that I have a rotary self-propelled mower, it is nothing special and it sells for $175. I think maybe they are comparable in price. Another thing I would like to discuss is the agricultural equipment industry has had a very minimal muffler, historically started back several years when they first started to build the muffler. And I wonder if you would care to comment on the idea that the difference in sound makes a difference? In other words, the "throaty" high powerful sound of exhaust is more desirable than the "tinny" mechanical type noise, which is associated with a machine being mechanically unsound. And the industry has been accused of allowing the exhaust noise to mask some of this more undesirable features and I wonder if you could comment on that?

Mr. BENNETT: I can say from my own experience that it is certainly true that in years past, mufflers were not nearly as good as the mufflers that we are using now. We believed at that time that our customers desired a particular quality of sound, perhaps, and I suppose we muffled accordingly and I can speak about one of my experiences, that I think is pertinent to the situation at hand.

When I first started to work for International Harvester, we changed at about that point in time from a 4-cylinder engine to a 6-cylinder engine of almost exactly the same displacement. The 4-cylinder engine was muffled to some unspecified extent. It had a rather sharp report, the 4-cylinder engine had bigger cylinders to get the same displacement obviously. They fired less often. It had a quality to the sound that was very sharp, would be the word, I would use to describe it.

At the time we introduced our 6-cylinder engine, we made a considerable improvement in muffling, and as a matter of fact, we made, I think, more of an improvement in muffling than our customers at that point in time, which was approximately 12 years ago, we made more improvements in muffling than our customers were willing to accept. Because our customers who were used to listening to this 4-cylinder tractor, complained about lack of power from a tractor that the dosimeter would show was more powerful and after struggling with the problem for approximately a year, at that point we solved the problem by putting a noisier muffler on the machine.

Now this was then, this is not now. I don't believe that that situation exists that led to that set of circumstances and actions. I think that our land grant schools and agricultural experimental stations and agricultural extensions is really what I mean to say, as well as the farm publications, particularly in the last 3 to 4 to 5 years or somewhere around in there have done a job of education on the farmer. And I think that quiet is now a desirable feature, rather than an undesirable feature that we found it to be 12 or 13 years ago.

Mr. **Strunk**: Where do you feel pressure to make your equipment quiet? Is it purely due to laws being passed and limits or are you feeling some feedback from your customers?

Mr. **Bennett**: We are aware of the consideration of legislation and this is certainly one of the pressures that affects our decisions. We also feel pressures from our customers. We now have customers who want to know dB levels. We never had, as far as I know, we never had an inquiry about dB levels, sound levels, I'm sure we didn't get any inquiries about sound levels 13 years ago. But, we are now getting inquiries from customers and dealers wanting to know about the new line of tractors we introduced earlier this summer. This education job that has been done has made our customers aware that this is one of the things they ought to be thinking about and they are thinking about it. This is one of the pressures that we feel.

I think another pressure that we feel that was discussed a little bit yesterday by Mr. Ramp, is a competitive pressure. We have some competitors who are doing pretty, a pretty decent job of making their machines quieter too and we just could not survive as a company building a tractor that is too noisy in this day and age, because the pressure of the marketplace will not allow any company to continue making any product that is inferior, particularly in the case of operator noise and also in the case of the noise at 7½ meters. We now have the University of Nebraska measuring and reporting into the public record what the sound levels of our tractors are. And this has a most desirable effect in lowering these sound levels because if our competitors are somehow managing to build machines quieter than ours, this bothers us. And we don't like that, and our tractors are made better for that reason, among others.

Mr. **Strunk**: I think it is interesting that the market has switched, according to your testimony, from 13 years ago of wanting some loud and powerful piece of machinery to now knowing design quality. One further question, you indicate that gasoline-engine powered tractors are 3 to 4 dBA's quieter than diesel. I wonder if you could give a reason why. In other words, is it exhaust noise or is it structural noise. There is a difference.

Mr. **Ringham**: If I may, I think we can attribute most of that to the nature of the combustion process in the 2 types of engines. The pressure rise rates in a diesel engine are much better than in a gasoline engine. We worked, in another one of our divisions, on diesel engine development and looking ahead to further improvements over the inherently cleaner operation of diesel to get oxide and nitrogen down, we are looking to reduce the peak pressure and this is one of the things we are evaluating and this is all very experimental at this particular time. But we are looking to reduce the oxide and nitrogen, actually to reduce the noise and get it down comparable to the gas engine.

Mr. **Strunk**: That's 3 and 4 dBA's different, due to structural noise?

Mr. **Ringham**: Structure responding to the combustion polls.

Dr. **Meyer**: Part of the problem too, is structurally connected, and I have become an instant expert on this problem in the last several months. Isn't it true that part of the problem of the diesel engine is that it rejects a lot of the heat into the air, far more than the gasoline engine. Because it has to have a greater amount of air circulating around it, it can be clogged and more open to a lots of noises generated within the engine?

Mr. **Ringham**: There are certainly things that are going around that get created as a result of the context in which they are presented. Some classes of diesel engines inherently have a hot air heat rejection rate so they are traded off as we get these diesel engines cleaner, their rejection rates may be up. It will probably go on unless we can increase the break-through rate and that leads to more noise if you speed up the fan. The appropriate way of doing it is to maintain the heat rejection rate at the same sound level, it is difficult to avoid comparing apples and oranges. Most of the time, you usually—you don't get a clear enough case to base a comparison on.

Mr. **Norton**: Just a quick comment. Mr. Botsford indicated he owned a rotary-type lawn mower and I would like to put on the record that I don't own any lawn mower at all. However, lest that be interpretated as a holier than thou attitude, I own a horse which does present a pollution problem.

Dr. **Meyer**: Well, thank you very much. I would like to make one point. It seems to me that the experience that you just cited about the publication of the University of Nebraska reports is a clear indication of a way of getting some voluntary pressures, if you would like to use them in that sense, into the marketplace. It is something that offers some advantages that we need to look at in some other areas. Thank you very much for helping us. We will take a 5-minute break.

(Whereupon, a recess was taken.)

Dr. **Meyer**: We will resume the hearing. At this time I should like to ask Mr. John Nesbitt, who is the Engineering Director of International Snowmobile Industry Association about whose products we have certainly heard a great deal, pro and con, to come forward.

STATEMENT OF JOHN NESBITT, INTERNATIONAL SNOWMOBILE INDUSTRY ASSOC.

Mr. **Nesbitt**: My name is John Nesbitt, the Engineering Director for the International Snowmobile Industry Association. Since our title is such a mouthful, we refer to it as ISIA.

The International Snowmobile Industry Association is a trade association whose membership includes all of the principal snowmobile manufacturers in the world. Our members produce over 90 percent of all snowmobiles. In addition to snowmobile manufacturers, the association membership includes manufacturers of component equipment such as engines, clutches, exhaust systems, controls, etc. The snowmobile industry and the ISIA have been concerned about noise and sound levels for several years. The industry also realizes the importance of noise control and is continually developing quieter snowmobiles.

The snowmobile industry supports the development of Federal regulations and their preemption of state and local control pertaining to uniform sound measurement methods and sound pressure level requirements for snowmobiles. This is needed to eliminate the multiplicity and variation of regulations from state to state.

In November of 1968, the ISIA Safety Engineers Committee was created to evaluate and establish safety recommendations for the industry. This committee includes the best engineering talent of the snowmobile industry and its suppliers. Thus it utilizes the services of a number of technical-oriented persons and experts in various fields with numerous years of experience on snowmobiles and their related activities.

In November of 1969, a sound level subcommittee was formed in the Safety Engineers Committee. This group developed the recommendation that snowmobile sound levels be less than 86 dBA when measured at 50 feet. This recommendation became part of Minnesota's Snowmobile Safety Regulations in June, 1970.

Engineers from the industry also contributed to the formation of the Society of Automotive Engineers' Recommended Practice J-192 entitled "Exterior Sound Levels for Snowmobiles." This document defines a measurement procedure as well as a recommended level of 82 dBA at 50 feet. This level was proposed by the SAE as one that could be achieved through reasonable developments and advances in the state of the art. Through the work of an "Ad Hoc" committee of the ISIA, who worked with the Federal Government of Canada's Department of Transport throughout 1970, the SAE J-192 test procedure and level became part of Canada's snowmobile safety standards and is to be implemented in February, 1972.

Considering the fact that sound levels of snowmobiles were from 88 to 92 dBA when these recommendations were made and adopted, the industry-developed standards will require the significant reduction of machine sound pressure levels. (67 percent).

In addition to Canada's regulations, at least 7 states have laws or bills that specify the adoption of the 82 dBA level sometime in 1972. These states are: Minnesota, Michigan, New York, Wisconsin, Illinois, Iowa and California. The first 4 of these states have over 650,000 snowmobiles registered. This represents more than two-thirds of the snowmobiles estimated to be in service in the United States. Other states have either not adopted specific sound level requirements or have adopted other values or figures.

Presently, snowmobile manufacturers throughout the world are working to meet the 82 dBA requirement. To accomplish this fact, they have to consider muffler shell and exit noise, carburetor intake noise as well as various mechanical noises that may come from the engine, clutch, drive train or support system. These noise sources have to be located; identified by frequency and level; and special provisions made to keep the summation of the sound level below that desired. To lower the sound level below 82 dBA will require further refinement of existing provisions as well as control of additional and other noise sources.

Although a noise is an unwanted sound, it isn't an annoyance unless someone is there to hear it, and its irritation factor depends on its pressure level, its frequency and its relationship to other sounds a person may be exposed to at the same time. Since sound pressure level is measured on a logarithmic scale, it is hard for a non-technical person to comprehend just what level a given sound may be. As the following typical sound levels are presented, keep in mind that an increase in 6 dBA represents approximately a 100 percent increase in or double the sound level and that a similar decrease represents a 50 percent decrease or one-half of the sound level.

Typical examples of sound levels: 20 dBA, Studio for sound pictures; 35 dBA, Soft whisper at 5 feet; 50 dBA, Private business office; 70 dBA, Conversation at 3 feet, vacuum cleaner at 10 feet; 75 dBA, Inside of car at 50 miles per hour; 82 dBA, SAE J-192 snowmobile noise standard at 50 feet; 86 dBA, Automobile accelerating at 50 feet; 90 dBA, Heavy city traffic; 95 dBA, Inside subway train; 100 dBA, DC-9 airliner inside; 110 dBA, Construction jack hammers and air compressors; 120 dBA, Rock and roll band; 130 dBA, Jet plane at 250 feet.

Per SAE's J-192, the maximum noise capability of a snowmobile is measured. This represents a dractic departure from existing procedures for measuring noise and sound levels from other types of vehicles. Since the snowmobile is operated a majority of the time at less than full throttle and at less than maximum acceleration, its noise exposure to the public will be considerably less than that specified in J-192.

Surveys indicate average speeds of 10-13 miles per hour (Snow Goer Trade, September, 1971.) Thus on a comparative basis, the snowmobiles that are being designed and tested now for sale next year will not only be considerably lower in noise nuisance factors than those marketed previously, but they will also exhibit a lower sound level than a majority of other common everyday noises that the average person is exposed to a greater amount of time, like automobiles, street traffic and airplanes.

The snowmobile industry encourages the adoption of the recommended snowmobile sound level at 50 feet of 82 dBA by 1973 made in the Leisure Time Product Noise Report published by the Leisure Subcouncil of the National Industrial Pollution Control Council. This report points out that compared to other urban and suburban noise sources such as buses, trucks, planes, road repairs, etc., snowmobiles and other recreational vehicles are a less serious problem. Also, that the recreational industry has been quite successful in reducing engine noise and that considerable research on machine noise reduction has been done and is continuing.

With continued research and developments over a reasonable period of time, noise levels for recreational vehicles including snowmobiles can be reduced to lower the annoyances that they produce. The Council also recommended for snowmobiles the levels of 78 dBA in 1978 and 70 dBA in 1983. Whether these recommended levels and schedules can be met is indeterminable at this point in time. More research is needed to determine this.

Some well-meaning individuals and groups have advocated the lowering of the snowmobile sound levels by 20 or 30 dBA's. Possibly, some of these advocates were neither familiar with the two-cycle engine and its inherent characteristics or the particular considerations and problems associated with the snowmobile and its operation in the snow.

For example, the two-cycle engine utilizes ports in place of valves for the control of the combustion mixture and the egress of spent gases. Thus, the pressure balance from carburetor intake through the muffler is very critical to the continued safe and efficient operation of the snowmobile engine under various conditions. Any provisions to reduce carburetor intake noise, engine mechanical noise or exhaust noise has to be developed for that particular model of engine.

Naturally, a snowmobile is designed to go over the snow. It exerts a pressure of approximately one-half pound per square inch on the surface it is traversing, a pressure very comparable to that exerted by a snowshoe rabbit, whereas man exerts 5 psi when walking. If additional sound-reduction equipment is required and a snowmobile becomes too large or heavy, its versatility will be reduced; it will be harder to maneuver and to operate in the snow; and its reliance or ability to bring you back from the woods under various adverse weather conditions will be reduced. Therefore, as we strive to reduce the noise emitted by a snowmobile, we have to consider the basic fundamentals of its engine operational cycle and a multitude of functions the machine has to perform in the field.

Through industry programs and continued association with organizations like the SAE and the National Research Council of Canada, sound levels can and will be lowered as new technical advances are made. However, the state of the art in noise suppression is not likely to make rapid quantum jumps but will undoubtedly advance step by step. Therefore, a program based on reasonable state of the art developments is more feasible than one which assumes technological goals not now clearly attainable. Also, lead times and costs must be incurred for research, development, testing, tooling and manufacturing to meet ever lower noise level requirements. If these can be spread over a number of years, the impact and financial burden on the industry and the ultimate consumer for the production of better equipment will be lessened.

Snowmobiling has given the unprecedented opportunity for more people to do more things in more places and, in most cases, as a family. The snowmobile has added a dramatic new dimension to the field of outdoor winter recreation. You don't have to hibernate any more. Now all ages can enjoy winter.

We recognize a snowmobile as a basic recreational vehicle that has considerable utilitarian value and use in the snowbelt areas of our world. No doubt snowmobile sound levels will never be low enough to satisfy everyone. However, its irritable factor to snowmobilers and non-snowmobilers alike can be lowered and essentially eliminated by better equipment, by the use of good operating procedures, by the use of snowmobile registration fees and other funds to provide additional and adequate facilities and by the passage and enforcement of uniform laws governing the use and operation of snowmobiles.

More research is needed to better define the effects of snowmobile noise on people and on wildlife. Progress in this area depends on cooperation of agencies such as the Environmental Protection Agency and on clubs and organizations concerned about the recreational use of the great out-of-doors. The industry stands ready to do its part.

Dr. MEYER: Thank you very much, Mr. Nesbitt. I will start on my right.

Mr. NORTON: I'd like to get into this area of maintenance of low sound levels and we talked about that earlier today. Let me back up just a moment. Yesterday we were told by the people from the Motorcycles Dealers Association that the dealers now are working very hard on an educational program with regard to the public and also will not, if I understand their statement correctly, will not work on machines that have been modified to make them noisier. Is the same sort of thing being done in the snowmobile industry, as far as dealers are concerned, to your knowledge?

Mr. NESBITT: Well, I think there are a number of education programs being conducted by the association, as well as its members. These have been primarily directed at the use as to how he should use his machine, how he should maintain his machine and that he should not take off the installed muffler or the guards or equipment the machine was built with. To date, to the best of my knowledge, there has not been any program directed to either distributors or dealers for maintenance of snowmobiles. However, just in the past year or so the snowmobile distributors and dealers are becoming organized in state or regional organization and with the formation of these type organizations, have cut across, not only various snowmobile manufacturers, but dealers and distributors of other products. This could be something that could be considered in the future.

Mr. NORTON: But there isn't a comparable program right now?

Mr. NESBITT: Not at this time through the dealers, no. The education programs have been to date, have been directed primarily on state levels for training of teenagers, before they are permitted to operate a snowmobile and to the user through safety bulletins and owners' manuals and so forth, on what he should care, the care that he should exercise while operating the snowmobile.

Mr. NORTON: This question of having a 70 dBA standard by 1983, do you feel that's a reasonable length of time, or do you feel, that that could be achieved even sooner? Is there a technology capability of achieving this sooner?

Mr. NESBITT: Well, I think you will see from the testimony that was given yesterday and earlier today that with the industry, there is a difference of opinion on this. We have companies like ONC, who are part of our association who have had years of experience in other applications. They have a large staff of people working on research and development of sound levels and they feel it can be made within that given schedule. We have others, such as Dr. Speckles of Rupp Industries, who are rather small and new industries and they don't have any experience or background that ONC and others may have and they feel it is projected a little too far or maybe too drastically a reduction.

Some say, yes, we can meet it today. Generally the industry is working to meet the 82 dBA level. Several of the members have come through and said okay, as of February of next year, 82 will be the goal. A year later we are doing down to 80 and we might be down to 78, but the majority of the people have not been able to project the capability say, past 78 or beyond the next 2 or 3 years.

Dr. BERRY: I'd like to ask you if there is any indication in the snowmobile dealers that a competitive advantage could be achieved through making a quieter machine available?

Mr. NESBITT: I think this very definitely is an advantage to a manufacturer and his distribution network to come up with a quieter snowmobile. I think you will probably see this next year where some people may be instead of 82, will be at 80 and as indicate earlier now, the public, because of education, and be concerned about environmental impact the last year or so, will be switching over and want to buy the machines. I think it is very definitely a competition position that manufacturers will take advantage of.

Dr. BERRY: Then you think that people are willing to buy, willing to pay more for a quieter machine?

Mr. NESBITT: I think within reason, yes.

Dr. MEYER: Mr. Nesbitt, I have a couple of questions I'd like to ask you. First, a report was made during a trip to Michigan, that at least in that state, I don't know whether this is a uniform practice or a local one, that the sale of certain types of snowmobile units of a high horsepower will be restricted to competition drivers, individuals who clearly are identified as purchasing equipment for competitive use and not for general recreational use. I don't know whether it is true or not, and I wanted to ask you if you had heard of that and if so, is it an isolated instance or is it a trend in your industry?

Mr. NESBITT: I think it is an isolated instance. It may have been or it may be one of the part of the bills pending in Michigan today. It is definitely not a requirement. However, when you look at the snowmobiles made and the size of the engines, when only 5 percent of those made last year had engine displacements, larger than 500 cc's, we are talking about a very small majority of the vehicles made. And here again, these are vehicles that are directed toward the racing circuit. In most states that is exempt from provisions such as mufflers, lights and so forth. However, with proper enforcement these vehicles would be used only on certified racing circuits.

Dr. MEYER: It has been brought to my attention that there is a small junior college or city-supported college in, I believe Wisconsin, that deals almost primarily with snowmobiles and snowmobile technology. You mentioned some questions here about the state of the art beyond the 82 dBA limit. Is the industry group considering or has it considered the possibility of putting some financial support into such an institution to help development, better technology. You are familiar with the little college?

Mr. NESBITT: Not the exact one, sir. I will give you some examples of what has been done in the industry. Last year the snowmobile manufacturers made a grant of $10,000 to a small college in the state of Minnesota. The state of Minnesota sponsored some other programs. This year, through the engineering and environmental committees of the ISA, grants are being considered to universities and colleges for various studies. I think right now we are in the process of going with 2 grants to the University of Wisconsin for studies on the snowmobile impact to animals and wildlife, as well as snowmobile impact on terrain and grasses and various crops.

Dr. MEYER: So you are having a fair effort to get some support outside the industry for financing?

Mr. NESBITT: Yes sir, just within the last year the association has had the funding available to go into this effort, but this year we anticipate to have quite, we hope to have several programs going by independent people, either testing laboratories, universities, outside of the industry so that we can get an unbiased opinion as to whether we are upsetting the environment or where we do have an impact, to gather the facts and figures together. We feel that we need the facts and figures to determine where we are in relation to others.

Dr. MEYER: We will want to be keeping in touch with you through my office.

Mr. NESBITT: Certainly, we will be glad to make any information available to you, just as we have in the past couple of months made the technical information available pertaining to noise and snowmobile sound levels available to you and your lab for evaluation and consideration.

Dr. **MEYER**: Which we have appreciated very much. Thank you, we will look forward to furtner communications. I would next call on Mr. Sacks.

STATEMENT OF NEWTON SACKS, JOHN DEERE & CO.

Mr. **SACKS**: Good afternoon, gentlemen, my name is Newton N. Sacks, I am Director of Safety and Environment of Deere & Company. Deere & Company is the manufacturer of John Deere farm tractors and equipment, lawn and garden equipment and just this year, snowmobiles.

We appreciate the opportunity to make a statement at this hearing on the subject of agricultural noise. We will limit our presentation to a discussion of noise abatement relative to farm tractors and equipment.

Over the years, Deere has cooperated with farms, industry and other organizations in many programs to study and promote the safety, health and welfare of the farmer and his family. One example of our early commitment to the comfort and protection of our customers is the unique design of seats introduced on John Deere tractors in 1960. This seat, combined the best in orthopedic and vibration criteria resulting from our intensive research and development in anatomy and physiology of the human body. Deere employed the services of two outstanding consultants in the field of orthopedics and industrial design for this work. The resultant seat was so well accepted, it established a number of design parameters that are in use today throughout our industry.

In recent years, our interest in the public good has included broad attention to the problem of noise. In addition to considerable in-house work, we currently are supporting noise research projects at two universities. Work at the University of Illinois is directed at reduction of noise with axial fans and engine mufflers. The program at the University of Wisconsin covers the long-range effects of snowmobiles on plant vegetation and noise on wildlife.

There are several Federal laws on the subject of noise control. There also are several pending Federal legislative proposals for additional coverage of the noise problem. For the most part, these proposals give the Federal Environmental Protection Agency authority to conduct research, establish standards and regulations, and promote the coordination of all Federal programs on noise.

If Congress does establish more authority in the area of noise abatement, such legislation should recognize the authority already vested in the Department of Labor under the Occupational Safety & Health Act of 1970. This authority permits the Secretary of Labor to control noise in the workplace (including the farm). Such control includes authority to set standards for the abatement of noise at the operator station of, for example, a farm tractor or a self-propelled combine, as well as abatement for the sake of other worksite employees.

As we see it, the problem of individual hearing impairment will be handled, for the most part, under this Occupational Safety &

Health Act. As far as agriculture is concerned, the Secretary of Labor explains that this Act applies to the jobs of some 1.3 million persons employed on more than 400,000 farms as well as to additional millions of people in agricultural processing and marketing industries. The Secretary of Labor has stated that it will be the policy of the Department of Labor to consult with the Department of Agriculture regarding the application and enforcement of the Act to agriculture and related industries.

In view of the breadth of this authority in the Department of Labor, it appears that additional "noise" legislation on the Federal level should be concerned with noise abatement protecting the general public from nuisance noise in "bystander" situations, i.e., the control of noise levels at 50 feet from a noise-generating source.

We anticipate that research will disclose no significant noise problem for bystanders in the use of farm machinery. We therefore do not think it will be found necessary to set "bystander" noise abatement standards for farm tractors and equipment. This is because mobile farm machines are usually operated in the rural open spaces and seldom close enough to bystanders to cause any interference.

We are concerned with the totality of the agricultural environment, the health, safety, comfort and economic welfare of our customers, obviously must be and is of paramount concern to us. Just the first of last month we introduced our model 90 electric riding mower, which produces a sound level of $82\frac{1}{2}$ dBA at the operators position and a level in use in the suburban environment of 63 dBA measured at 50 feet. You heard some of the work commented on by Professor Yoerger of the University of Illinois, which is directed at reduction of the cooling fans and engine exhausts.

There is also a program under development at the University of Wisconsin, in which we are participating with the ISA and others, which covers the long affects of snowmobiles on plant vegetation and noise on wildlife.

Farm equipment is manufactured for country-wide distribution. If the industry is subject to individual state and local standards and regulations which vary one from another, manufacturers will be forced into varying degrees of custom design and production and this will result in a totally unreasonable burden on the manufacturer, the dealer, and the customer. This problem has been recognized by the Honorable William D. Ruckleshaus in his statement to the effect that Federal action is required to achieve a national uniformity of government action which will avoid "undue disruption of the manufacturing process".

In our opinion, therefore, in any future Federal legislation there should be Federal preemption of all state and local action (standard setting and labeling) on noise control except that which pertains to local zoning and time use limitations. We are of the firm opinion that there should be such preemption under any of the following circumstances. A, if a Federal standard or regulation is established; B, while research is being completed preliminary to the adoption of Federal standards or regulations; and

C, if Federal action is deferred in regard to certain machines and equipment.

To accomplish this preemption we suggest the language to read as follows: No State or subdivision thereof, shall adopt or enforce, with respect to any product for which noise generation standards have been prescribed, amended or deferred by the Administrator under sub-section (a) of this section, any standard limiting noise generation characteristics different from standards prescribed by the Administrator or inconsistent with other action taken by him. Nothing in this section shall diminish or enhance the rights of any State of subdivision thereof otherwise to control, regulate, or restrict the use, operation or movement of such products.

Section 7(c) Nothing in this section shall preclude or deny to any State or subdivision thereof the right to regulate product labeling in any way not in conflict with regulations promulgated or inconsistent with other action taken by the Administrator under this section.

I also have with me, two colleagues, both directly involved in these efforts, Mr. Myron L. McCann, who is the Division Engineer or Product Engineer, involved with our mower development and James Jenson, who is head of our Operator Environmental Department at our Product Engineering Research Center and if there are any questions, I am sure that we would be glad to respond to them.

Dr. **Meyer**: The Chair recognizes these gentlemen. If any of the panelists have a question which you feel should be answered by them, you may ask them to respond.

Mr. **Sacks**: In the proposed legislation for Federal noise control, there appears to be interest in the matter of labeling products as to their noise level. In this regard, it is important to realize that farm machines most generally are used in combinations—as a part of some kind of system. Examples are a farm tractor pulling a PTO-driven forage harvester or baler, or carrying a mounted sprayer system. The makeup of these machinery systems is often unpredictable as farmers readily mix different makes and models of machines. Most important, the noise level of each machine in the system may vary widely depending upon the nature of the job to be performed and the speed and load at which the farmer chooses to operate. Labeling a farm tractor or other machine with a notice of some noise level in decibels, will therefore be of little value to a purchaser relative to the noise generation characteristics of any combination of units which he might use. Therefore, if farm tractors and equipment are to be labelled, consideration must first be given to the matter of what type of test mode is to be prescribed as representative of field use and what form of notice would be appropriate and meaningful.

In recent years, Deere has applied itself to the development of designs for farm tractors and equipment which reduce sound level at the operator station. Work continues along this line with, of course, particular reference to the requirements which may be established by the Secretary of Labor under OSHA. While this work and development of data has been and will be related principally to operator noise exposure, a sufficient number of simultaneous measurements of noise at the operator station and at 50 feet have been taken to establish a strong correlation between the two for typical tractors.

In ten tests of John Deere tractors, ranging from 47 to 145 horsepower, and having drive-by-noise levels ranging from 80 to 86 dBA, the drive-by noise at 50 feet was found to range consistently between 12 and 14 dBA below that measured at an operator station without cab. This observed correlation strongly supports the contention that work required to reduce noise at the operator station on tractors without cab to levels which may be required under the Occupational Safety & Health Act will result in correspondingly reduced drive-by or bystander levels. Thus, while we feel that "bystander" noise level control most likely is not necessary for farm tractors and equipment because of their involvement principally with the rural atmosphere, it is noteworthy that our work to reduce noise levels at the operator station on this equipment will likewise continue to reduce noise levels for bystanders.

It may also be worth noting that farm tractor noise has not increased in spite of a continuing trend to more powerful units. This is supported by a comparison of data from tests conducted by the University of Iowa in 1957, data from tests of our own and representative competitive tractors in 1965 and 1970, and tests at the University of Nebraska in 1970. These data show that actual noise levels have been appreciably reduced even with an 80 percent increase in horsepower.

We wish to again express our appreciation to you, Dr. Meyers, and to your office and panel, for the opportunity to contribute to your quest for information on noise abatement. As stated, we are committed to large expenditures of effort to reduce machinery noises, both because of an ethical desire to prevent injurious noise levels and because of our desire to add to all around operator comfort. If it would serve your purposes, John Deere will be glad to arrange a demonstration of equipment procedures and instrumentation involved in this work.

Dr. **MEYER**: Before asking the panel if they have any questions or comments, there are a couple of things, I think I should make observations on. One, we clearly are going to work with the Department of Labor with regard to the relationships of general community environmental noise requirements in any overlapping or apparently overlapping areas of jurisdiction to the operator, who of course, is clearly covered by Occupational Health and Safety legislation and he will be provided for by that approach. As a matter of fact, we have a view being developed that one of the ways, as you have rightly pointed out, to pacify is to protect the operator. And of course, there are some degrees of latitude in the occupational safety regulations which infer, that while equipment control is the most desirable, the way the operator can still comply with the law is by using protective devices. Although that's less desirable, we are going to have to explore how we do our part of the chore to help agriculture and primarily help education, because we would, under the new legislation have the real equipment standard setting authority.

The question as to how far their authority goes on equipment is kind of undecided. It would be clear in this legislation that we would have, I want to assure you and the rest of the industry, a close working arrangement with industry. In fact, one of the individuals from my staff, who is concerned with interagency coordination, Mr. Marrazzo, is here. He is my deputy for that purpose and one of the reasons he has been here is to get a good feel for this need. I am glad you have recognized this.

One thing that I think I ought to comment on, and that I know you made some suggestions regarding, is pending legislation. Am I correct in assuming that what you are saying is that assuming the law was passed in the form you are suggesting, it could still be considered by the committees that if we had prescribed a regulation or were amending one or had made a formal statement, that for the time being we had considered it, then you would say that the state would be precluded, is that the—

Mr. **SACKS**: That's correct.

Dr. **MEYER**: So because you see what the law did envision and I think it is important that industry realize that this law envisions that if the environmental protection agency was silent and did nothing, then the state could indeed go ahead and set standards. We accepted that responsibility because the problems are so broad in this area that we would attack those things which were the most important from the viewpoint of public health and welfare first. And in the interim, states might very well act because they weren't preempted. You are suggesting we would have to identify some things that we'd have to get around to in a year or so.

Mr. **SACKS**: We think this is necessary, if the concept of preemption is to work well at all because frankly today there seems to be an almost chaotic confusion of overlapping requirements by various states, localities and as other witnesses have testified, this would be an almost impossible situation for a manufacturer to work into.

Dr. **MEYER**: I am beginning to get a feel for something. At the end of today's testimony I will make some comments on it, but I certainly am getting a much better feel at our level for some of the problems of the agricultural sector. There was one other question that I did want to ask you concerning the fact that there has been considerable emphasis in this testimony on this equipment being used only on the farm while one of the panelists pointed out that some of this equipment is used in construction sites as well. The thought occurred to me, do you know or have any feel for the numbers of units or percentage of units which are utilized or what amount would be recreational, rural sites?

I am thinking of the 5-acre tracts. I noticed one advertised in the newspaper here of a 5-acre development. These are springing up all over the nation, not just in the Intermountain West. And it certainly would appear to be a larger community. I don't know what you call these types of recreational communities, but one of the reasons to move to them is the peace and quiet. And I wonder what experience you had with that sort of usage. Maybe you can tell me.

Mr. **SACKS**: I don't think I can respond to you with any degree of accuracy. Of course, on a small 5-acre site, usually the owner can't readily afford an agricultural tractor, which is fairly expensive. He might use a smaller lawn and garden type of tractor or perhaps in some cases, other agricultural tools, such as a roto cultivator which are hand-operated or I am afraid I cannot—I'd like to, but I just don't know if there is any survey of that usage.

Dr. **BERRY**: I'd like to ask Mr. Sacks if he feels that the Environmental Protection Agency has a responsibility to provide an educational input for those technical people in your organization in order to increase their competency, as you attack this problem more specifically. I think I'd say, do you think that the Environmental Protection Agency should provide short courses in noise control for farm machinery, possibly following this with short courses for noise control for mowers and another course for snowmobiles?

Mr. **SACKS**: Doctor, let me say this. I think that much of the testimony here in the last 2 days has indicated that we do need a great deal more knowledge in this area. And in the overall context of the responsibility of the Environmental Protection Agency, I certainly don't think that that would be precluded. I don't know if your mandate is to do that, but from my own standpoint, I'd say that it would be a good thing providing that the Environmental Protection Agency can either, from its own staff or perhaps reaching out into knowledgeable factors, provide this information.

Incidentally, I think this would be an excellent area for a cooperative interrelationship with the Environmental Protection Agency and industry. Certainly there is some expertise that resides in industry. Certainly industry needs to have a great deal more knowledge and to find some way to pool it and share it.

Dr. **MEYER**: That's the thought that I may want to explore at the end of this session with some of the industry representatives. Just bouncing ideas around at the end of this day's hearing. It certainly sounds very important.

Mr. **BOTSFORD**: I'd like to add to what Dr. Meyer said about this notion of farm tractors being operated in rural areas. In the town where I live, a town of about 80,000 people, I can think of a half a dozen farms in the city limits, maybe 10-20-acre tracts.

Dr. **MEYER**: Was that a question or just a statement?

Mr. **BOTSFORD**: Just a statement.

Mr. **STRUCK**: I wonder if you could release the information, tell us what percent of your engineering effort has applied specifically to noise control, say, going back over the past 10 years and what you feel is going to be needed in the future to meet the standards which may be brought to bear on your industry?

Mr. **SACKS**: Yes, first of all, let me preface my remarks by telling you that we have currently no good way to isolate these costs from our total engineering costs. I must apologize. Perhaps this will be good to have, but we, at this time, do not have that kind of an accounting breakdown. I can tell you this, however, that going back 10 years ago, I would say that our direct input on noise, as such, was small. But, within the last 5 years it's become a very appreciable and a very significant part of our total engineering effort.

At our Waterloo Product Engineering Center, which represents one of our major technical areas, over 9 percent of our engineering budget is currently being spent on noise reduction. We anticipate that this increase will continue. On my staff at corporate headquarters, out of the 10 professionals, I would say currently, and of course all of this environmental—I might add, but on noise alone, currently we are probably spending about 25 percent of our time. I fully anticipate that from what lies ahead, both respect to product and of course, we must also handle the industrial aspect of noise under OSHA, then it will easily reach half of our time input.

In addition to our product engineering center, we have a technical center, which, and this is an estimate, 5 professionals and 5 technicians are spending full time on noise control. In addition to that in the other divisions of the company I would estimate that there are between 10 and 12 professionals and about that many technicians that are spending most of their time on noise control.

Mr. **STRUNK**: What pressures are being brought to bear on your industry? Is the customer demanding a quieter product or is this that you are looking forward to the requirements that are going to be forced upon you?

Mr. **SACKS**: Well, I think that the preceding speakers, from our friends at International Harvester, speak well to this point. We could pretty well echo their thoughts. In the recent past, I don't think our customers were themselves overly concerned with noise. In the last several years, we are noticing an increasing interest on their part. The principal concern that we have had is, of course, in meeting the requirements that OSHA may promulgate and of course, the competitive aspects.

No manufacturer can be far behind any other in our industry, which is highly competitive on all counts, function, durability, safety, comfort, convenience and so forth, for very long without feeling a severe affect in the marketplace.

Mr. **STRUNK**: It is competition and the competitive sort of thing, but not necessarily pressure being brought by your customers, but what you anticipate might be pressure from your customers, if you don't compete with the competition?

Mr. **SACKS**: I think it is the sum of all three of these. We actually, at this point, I would say that the customer concern is apparently the least.

(The following was submitted after the hearing by Mr. Sacks.)

At the Denver hearing, strong interest was shown in the May 1971 NIPCC report entitled "Leisure Time Product Noise." Since this report makes recommendations concerning both operator and environmental noise levels for products which we market, we wish to comment.

We concur with the intent of the NIPCC report and can meet the 1973 noise levels for equipment we market. We also endorse the concept of five-year progressing targets with prior public review, as the five-year interval provides the necessary time to design, test and tool for quieter machines in a systematic manner in order to meet stringent noise standards. It is necessary that industry and the public have the opportunity to review recommended goals with adequate time provided prior to their being adopted as mandatory regulations in order to evaluate the technological and medical data which may then exist and to carry out engineering and development in an orderly manner. In this way, progressive guidelines and goals can be consistent with any advances in technology or medical data as may develop. Furthermore, this process will stimulate competition for improvement and will result in optimum benefit for the public. Additionally, we strongly support preemptive federal noise regulations in this area.

1. *Operator Noise Level*

In discussing equipment noise, two different effects need to be considered. First, the sound level at the operator's ear which may cause hearing damage and second, the environmental or nuisance noise.

Our first concern in noise abatement must be directed at preventing hearing damage to the operator. To date, noise criteria in the United States aimed at safeguarding hearing has been based upon Occupational Safety and Health Act standards. While these standards are based upon sound medical data, they were developed from the perspective of the industrial environment designed to provide hearing protection for individuals involved in daily routine exposure to job-related noise for 40 hours every week, 2,000 hours a year, over a working lifetime of approximately 47 years.[1,2] The operation of snowmobiles and chain saws as listed in Schedule A of the NIPCC report involves noise exposure only over relatively brief periods of time and for intermittent and quite variable noise intensity levels. For example, snowmobiles are rarely operated more than four hours per day or for more than 25 days per year.[3] The noise dosage and hearing damage risk for this type of exposure is greatly different than that contemplated by the OSHA criteria. This is not to suggest that there is not a potential for hearing damage in operating recreational equipment, but to emphasize that an applicable basis for establishing maximum sound levels for recreational equipment does not now exist. We strongly recommend that noise exposure profiles during machine use cycles be determined and correlated with potential hearing damage for all classes of recreational equipment.

The International Snowmobile Industry Association has established an engineering subcommittee to make a study of use cycles of snowmobiles for this purpose. The EPA emission work with Southwest Research Institute now ongoing could also provide additional or verifying information on this subject. When a use cycle and sound level intensity at the operator's ear is determined, then maximum operator ear sound level limits should be established which are based upon medically determined hearing impairment criteria.

Until such time as research is complete, we suggest that the 1973 NIPCC noise levels at the operator's ear be promulgated.

These goals are attainable and reasonable at this time in consideration of the short and intermittent use periods of chain saws and snowmobiles. The sound intensity experienced by operators is significantly below the maximum during a majority of the running time,[4] and caps, hats or helmets are worn which muffle the sound and are also necessary for protection against cold and crash.

The snowblowers and mowers listed in Schedule A of the NIPCC report differ from snowmobiles and chain saws in that they do operate at full throttle when being used. Of the machines in the NIPCC report, mowers are most likely to be used commercially for a major part of the year. Despite this potential high use, the 1973 NIPCC goals are appropriate for hearing protection.

2. *Environmental or Nuisance Noise*

The task of determining appropriate levels for nuisance noise is difficult because of the subjective nature of the problem. To date, we are unaware that any responsible rationale has been offered for which environmental or nuisance noise guidelines might be drawn. We would like to suggest the following approach be used which we believe has merit.

As examples, we will use two situations—snowmobiles and mowers—to develop acceptable environmental noise levels outside the house. These are then converted to 50 foot machine noise level requirements. Most snowmobile complaints result from operation of snowmobiles in the suburbs during winter nights. Studies demonstrate that the normal suburban residential interior sound level in the evening is 45 dBA.[5,6] The data also indicates that in winter when windows are closed, there is a 20 dBA drop from outside to inside.[7] Additional studies point out that annoyance is a factor when the sound level increase is more than 10 dBA above the background noise.[8,9] Combining the data (45 + 20 + 10) yields 75 dBA as a maximum allowable level adjacent to the outside of a house that will not annoy the resident inside during a winter evening.

We recommend that 78 dBA at 50 feet become the snowmobile requirement. The 75 dBA maximum allowable noise level outside will be achieved through reduced speed and less than full throttle operation in residential areas. Recent ISIA environmental studies have demonstrated that the drive-by or 50 foot noise level for snowmobiles drops 3 dBA per each 10 mile reduction in speed. This indicates that machines with a 60 mph capability (quite common) when operating in a 30 mph residential speed zone will have a noise level reduced by 9 dBA. Therefore, a 78 dBA machine will produce 69 dBA at 50 feet at 30 mph under cruise conditions. This is below the 75 dBA annoyance level at the house wall and quite comparable with the automotive noise levels in residential areas with which we live daily.[10,11] While 9 dBA is an empirical adjustment, conservatively, 3 dBA is chosen to allow for engine acceleration during stopping and starting.

Riding mowers are generally used during summer days. Data shows that normal *daytime* sound levels inside a house are about 55 dBA. In the summer in non-airconditioned homes where the windows are open, a 10 dBA sound level drop from outside to inside exists.[7] Since a house level of 10 dBA or greater above the background level is required to initiate annoyance,[8,9] the acceptable outside noise level would be (55+ 10 + 10) equal to 75 dBA.

Approximate distance for riding mower operation to a neighbor's home is 25 feet. Seventy-five dBA at 25 feet is equivalent to 69 dBA at 50 feet and; therefore, this is our recommendation.

3. *Recommended Environmental Noise Levels*

Based upon the above comments, we recommend that the 50 feet noise levels with respect to nuisance noise for snowmobiles, rotary power mowers, riding mowers, chain saws and snowblowers be adopted from Table I which follows:

TABLE I

PROPOSED 50 FOOT NOISE LEVEL (dBA) LIMITS

	Type of Equipment				
Criterion	*Snow-Mobiles*	*Rotary Power Mowers*	*Riding Mowers*	*Chain Saws*	*Snow-Blowers*
1. Normal house background noise level during night or day. (5 & 6)	45	55	55	55	45
2. Noise attenuation by house walls with open windows in summer and closed windows in winter. (7)	20	10	10	10	20
3. Additional noise above background before annoyance results. (8 & 9)	10	10	10	10	10
4. Allowable noise level outside the house.	75	75	75	75	75
5. Correction factor for equipment being operated closer (25') or farther (100') from neighbor's residence than standard measuring distance. (a)	0	—6	—6	+12	—6
6. Correction factor for operating machine at less than full throttle in residential areas. (b)	(c) +3	0	0	0	0
7. Recommended 50 foot noise level (dBA).	78	69	69	87	69

Note: a. This assumes all engineering noise measurements will continue to be based on standardized measurements 50 feet from the operating equipment.

b. This assumes engineering measurements will continue to be made while equipment is operating at full acceleration at full throttle.

c. Actually 30 mph speed zones would allow 9 dBA to be added for 60 mph top speed machines at cruise conditions. Due to uphill acceleration resulting in additional noise, only 3 dBA is conservatively added at this time.

We believe that the levels in Table I for noise measured at 50 feet from the vehicle are a conservative, rational basis upon which to establish regulations. These levels are conservative because the extra noise attenuation by air conditioned homes with closed windows is ignored, most snowblower operations are completed during the day, and machines are often operated at less than full throttle.

4. *Noise Disturbance of Wildlife*

The problem of noise generated by leisure time equipment disturbing wildlife is not well understood. While no one questions that the disturbance to wildlife must not be disregarded or taken lightly, it is clear that most recommendations in response to this problem are based upon emotion rather than knowledge.

The ISIA in association with responsible members of the snowmobile industry have initiated a research program to be conducted by the University of Wisconsin which is directed at obtaining data concerning the effect of snowmobile noise on wildlife. The results of this research and other objective studies which may be initiated should be reviewed prior to establishing mandatory long-range usage or noise regulations designed to protect wildlife.

Summary

We believe that sound levels both with respect to operator hearing protection and reduction of nuisance noise should be established on the basis of reasonable objectives that relate to the best knowledge available. We appreciate and concur with the position that efforts to control noise should be initiated promptly and not be held in abeyance until all necessary research has been completed. We therefore believe that the 1973 NIPCC recommendations should be established as guidelines as these are reasonable, attainable and provide a full measure of protection both with respect to operator hearing impairment and nuisance noise. Deere & Company's objectives are that our products shall not cause injury to our customers, nor create annoyance or damage to the environment. We are committed to making prompt and positive efforts to meet these goals. We believe noise level regulations for both hearing protection and nuisance limits should be premised on medical and technical data and not go beyond these requirements. We recommend that the EPA take the necessary steps to bring government, industry, the medical profession, trade associations and technical societies together on a cooperative basis to establish a coordinated program in which the complex problems of noise abatement can be solved on an optimum basis to provide the greatest degree of real benefit for the American people.

We assure you of our utmost desire to cooperate in helping resolve the complex problems of noise reduction. We would be pleased to work with you, your staff or other organizations and extend a most sincere invitation for you to visit our facilities and view demonstrations of any of the equipment which we manufacture.

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[10] Chicago Urban Noise Study, Vol. 1, Noise in the Urban Environment, Bolt Beranek and Newman, Inc., pages 38 and 38a.

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Dr. **MEYER**: Thank you very much. We now have two gentlemen from the University of Nebraska tractor test laboratory and the Division of Speech Pathology and Audiology. Dr. Splinter and Mr. Deshayes, will come forward please?

STATEMENT OF WM. SPLINTER, UNIVERSITY OF NEBRASKA

Dr. **SPLINTER**: My name is William Splinter, I am Chairman of the Department of Agricultural Engineering and a member of the Board of Tractor Test Engineers at the University of Nebraska. This is a red book—

Dr. **MEYER**: It was introduced in evidence.

Dr. **SPLINTER**: As a result of legislative action in 1919, no tractor may be sold in the State of Nebraska without first having a stock model tested by a board of test engineers under the control of the University of Nebraska. Endurance, horsepower and fuel consumption tests were required. The latest revision of the original bill (1971 Legislature) specifically includes tests "related to the health and safety of the operator or the public as may be established and required by regulation promulgated by the Director of Agriculture." Results of all tests are available to the public.

As a result of tests conducted by Simpson and Deshayes, Division of Environmental Health and Safety, University of Nebraska in 1965 at the Nebraska Tractor Test Laboratory it became evident that tractor noise could be a significant factor in hearing losses of agricultural workers as reported in their study, "Tractors Produce Ear Damaging Noise", Journal of Environmental Health, V31 No. 4, 1969.

Their studies included 55 tractors, tested at 100 percent, 75 percent and 50 percent load, as well as combines, corn pickers and other agricultural machines. Noise levels were measured up to 113 dBC in the sitting position and 114 dBC in the standing position. The minimum sound level was 90.0 dBC at 50 percent load. At full load only three tractors had a measured sound level below 100 dBC, with 97 dBC being the lowest reading.

Research efforts were initiated at the Nebraska Tractor Test Laboratory in 1966 to measure and quantify sources of sound from tractors and to explore procedures to obtain reproducible and representative tests of noise. Discussions were initiated with the Society of Automotive Engineers Technical Council Tractor

Test Code Subcommittee, comprised of engineers from various tractor manufacturing companies, on procedures and instrumentation techniques for measuring tractor noise. Farmers and agricultural leaders, who formed an advisory committee to the Tractor Test Board, were involved in discussions relating to noise tests, their importance to farmers and the most meaningful way to present research information on noise to farmers.

The research program revealed that extension of the exhaust stack to a point above the operator was a simple method of reducing exhaust noise by as much as 5 dB. Most tractor companies now extend exhaust stacks. Results of the research program and discussions with the SAE Tractor Test Code Subcommittee have resulted in a procedure document which outlines the method by which sound tests may be made to give reproducible results at the Tractor Test Laboratory (Appendix A). The interest expressed by the farmers on the Tractor Test advisory group was a key factor in initiating sound tests on all tractors tested at the Tractor Test Laboratory beginning in March, 1970.

The results of the sound tests are incorporated in the Official Tractor Test report (Appendix B) and in the Summary Test Booklet which is issued annually. These results include tests with the microphone at a position 2½ inches from the operator's ear at full load, 75 percent load, 50 percent load full throttle and 50 percent, partial throttle. They also include a measurement of noise level at a bystander position 25 feet from the centerline of the tractor with the tractor accelerating at full throttle.

At this time, 44 tractors have been tested for sound level in addition to endurance, horsepower and fuel efficiency. The results are summarized in Appendix C. These sound level readings are made using the "A" weighted scale rather than the "C" weighted scale used by Simpson and Deshayes. Therefore results are not exactly comparable.

"However dBC ratings are available from the test record. The average noise level for 12 American made tractors tested this year (1971) was 101.2 dBC for tractors averaging 98.03 drawbar horsepower. This compares to an average of 104.8 dBC for the tractors listed in Simpson and Deshayes having an average of 48.85 drawbar horsepower."

Of the 44 tractors tested since March 1970, the 2 highest readings were 100.0 dBA at the operator station at full load. Three tractors have measured only 88.0 dBA at full load and one tractor measured 87.5 dBA at full load (Nebraska Test No. 1070.) This tractor developed 123.32 horsepower on the drawbar (Appendix B).

A tractor of the same make, having essentially the same horsepower but without a cab (Nebraska Test No 1069) measured 99.0 dBA at the operator station under full load.

Our observations would lead us to conclude the following: 1, In the short span of 5 years design engineers with tractor companies have effected roughly a 3 dB drop in noise levels at the operator station despite a general increase in horsepower level. 2, Most tractors currently on the market still exceed the 90 dBA level usually accepted as the allowable sound level for 8 hours exposure. 3, At least two manufacturers (7 tests, 6 with cabs, 1 without cab) have reduced noise at the operator station below 90 dBA. Therefore, the technology exists today to obtain acceptable noise levels with or without cabs.

The University of Nebraska Tractor Test Laboratory will continue to offer an impartial measurement of the noise levels of agricultural tractors in the form of published reports which are available to anyone.

Dr. **MEYER**: Thank you very much for a very comprehensive presentation of some very important questions. Before we ask some questions, I think it would be useful if we would also hear from Mr. Deshayes.

Mr. **DESHAYES**: Thank you Mr. Meyer, I am not going to read my text because you do have it in front of you. I feel that I may be hearing it all over again and—

Dr. **MEYER**: If you would like to summarize it, fine, it will be included in the record and I might note for the record also that the attachments to the previous statement will also be incorporated in the record.

STATEMENT OF IRWIN DESHAYES, UNIVERSITY OF NEBRASKA

Mr. **DESHAYES**: The purpose of my being here today is threefold really. First of all, to present some of my personal findings, as a speech pathologist and audiologist at the University of Nebraska, consulting audiologist for the University Health Service and also in private practice.

My first concern is with the hearing problems of the general public and being from Nebraska, a great deal of this is in the agricultural area. Because of this then, my two other concerns are No. 1, the type of protection that we can provide for these people and thirdly, what can we do to promote information to the general public.

Today and yesterday, there has been a lot of concern about agriculture and the affects of agricultural equipment on the general population. However, one concern that I have noted was that they kept saying that the individual out on the farm is away from the general population and we should not be concerned too much about maybe the total annoyance factor. However, in my everyday work, I deal with individuals and these individuals are the tractor drivers and so I feel that we do have to be concerned with these individual people because when you consider it, there are a great many tractor drivers in the United States. So, this isn't just an individual thing, this becomes a large population. So we have to look at it in this area also.

Other factors that have been brought out, pointing up that the total time involvement that the individual tractor driver is on his tractor, the one thing that I'd like to point out is that there, I feel, a difference between an industrial worker and an agricultural worker. The industrial worker—now, at the beginning I don't have any good figures on this, but I would—let's say that generally they may start at the age of 18-19-20 years old, when they get out of high school and start working in an industry. They work in this type of environment until they usually retire at the age of 65.

The agricultural worker however, is in a little different situation. This is a person who is reared on the farm and I hate to say this, but a great many of them start driving tractors at the age of 10. It isn't the noise factor here as a concern, but the large factor, and if you look at the statistics lately, there have been a great many deaths of young tractor drivers in this type of thing. But, they are starting to drive the tractor at age 10. They don't retire at age 65. We have many farmers who literally die on the farm, driving their tractor at a much older age, so the total time period that they have been exposed to this type of noise, I feel is a factor that we have to deal with.

Now, Dr. Fletcher mentioned, I think earlier today, when they were discussing the permanent hearing loss versus the temporary threshold shifts, pointing out that many times in agricultural areas or in industrial areas, certain noise temporary threshold shift may take a great time. Well, I think we have to look at this, or the farmer himself, that over a long period of time and especially when he is on his tractor 16 hours a day at the peak period, and it has been presented here, like during planting and during harvesting, that this may be a greater damage total experience hearing than a person working in an industry around noise on a solid 8-hour period.

Some of the things that we are finding, and I will now comment on your question that was brought up in San Francisco. We do not have statistics available at this time. These are things that we are seeing while we are gathering our data. We are now presently looking at a mass of data and we realize that we are going to have problems putting this through a computer system because the University of Nebraska a few years back, instituted the testing of the speech and hearing of all incoming students and we are dealing with figures of 4,000 students each year that we are screening. We do have some comebacks and do a greater evaluation. This was not because of noise, but mainly it started out with speech and we added hearing to it later, looking at other factors.

We have noticed a trend and we have no statistics on this, this is just a personal observation that we are noticing, that it appears that the group from the agricultural areas, we are finding more hearing problems with than in groups that are not from the agricultural area. We are not finished yet and maybe this is because we don't have the statistics on it yet. We are in the process of doing this. They may not show a greater hearing loss, but we are finding more problems.

We also, in other areas, we do State Fair Testing. Last year we completed our 8th consecutive year that we do State Fair hearing tests. This is sponsored by the Nebraska Sertoma Clubs, throughout the state and of course here, we get a lot of people that we screen through the hearing program. We are finding here also that many of the agricultural people are showing hearing losses. At the Tractor Days at the University Agricultural Department, sponsored each year, we have started to test the people's hearing there. And this year finding a surprising number of people with hearing problems.

However, I think we have to be realistic when we look at some of these records, especially from the State Fair record and the Tractor Day. I have a strong feeling that the people that we are testing have a feeling that they have a hearing problem and wanted it confirmed and we are not getting the total population and I think I can safely say that we realize that not all people associated with noise do have hearing problems. And I will point out that one gentleman that I tested at the last Tractor Day had been on the farm all of his life, except for a few years in his teenage years, when they farmed by horses, he has been on tractors. He is 68 years old and he passed the screening test. He doesn't even show any particular problems, so not everyone associated with noise is going to have a hearing problem.

Some of the problems that we see at the University in looking at agricultural students versus students from the city, we are finding here that we just can't correlate because they are from a farm, because the students in town, from town, are in construction work, they do hunting also. They are in rock and roll and I think there is—we need to do a lot of research here into finding, picking out the certain aspects of this.

I'd like to now, talk a little bit about ear protection. As Dr. Splinter has pointed out, and I think has been readily pointed out in the last 2 days, the agricultural industry is doing a great deal in trying to lower the overall sound of their equipment. But, as also has been pointed out, there is a lot of equipment out on the market today or out in the field, I should say, that is not equipped with these protective devices. Therefore, it is our job as audiologists and people concerned with the noise problem to inform the people to use ear protection.

Now lately there has been a lot of discussion and research about ear protection and this, we are finding out, is not always going to be the solution. In my personal experience with farmers, we have some problems here. Ear muffs tend to be very hot in the summertime. Ear plugs, over a long period of time tend to be very irritating. There has been some concern that ear protection tends to decrease the ability to understand speech and things like this. Or that they may cut out enough sound that they will not be able to hear the equipment and there we have a safety factor.

There needs to be more research in this area. We have done some research at the University of Nebraska, a master's thesis, which we looked at ear muffs, ear plugs, and custom molds to see the effect on speech reception and there is some problems here. But I do feel with proper education and further research that we can help, that we can make changes here and still provide adequate ear protection for these people.

I think the most important thing though, is to inform the general public of the problem at hand. The people here today are people in industry and in universities that are concerned about noise pollution, but the average farmer, a great many of the average farmers do not realize the health hazard. They realize the noise problem, in fact most farmers will tell you they have noise. Noise has been associated with farming for a good many years and they just have to live with it. But a great many of them do not realize the potential health hazard that it may be and

I think this is where we need to get to them. Through certain organizations, the Sertoma Clubs, for instance, in Nebraska, where they are providing the hearing tests at the State Fairs and having a little institution for these people. This is fine.

The tractor testing and what they are doing, I think, is informing the people and most importantly now, is the agricultural engineering society, the students themselves, have made it a project now in Nebraska where they are selling ear protectors, ear muffs and ear plugs. They are going out to individual farm groups and talking to them about the awareness of sound. We are now in a project where we are, at the University of Nebraska Speech and Hearing Clinic, and a couple of the service units which are associated with these public schools, we are now instituting a pilot project where we are going in and informing the elementary level and the secondary level on the total problem of noise pollution—what it is and what can be done about it.

I think when we are dealing with protection and noise and everything, I think we do have to realize that it is kind of like maybe this is a bad analogy, but it isn't, the problem of drugs, we have a great many laws today about the problem of drugs, but we still have a great many problems with drug addiction and now we are starting to get at the very early level, these young kids, clear down in kindergarten teaching them about the problem of drugs and I think this is where our big effort is going to have to go. Thank you very much.

WRITTEN STATEMENT BY IRVIN DESHAYES, M.A. AUDIOLOGIST

It is interesting to note that the greater portion of those here present, and those at other hearings and meetings of this kind are a special breed. You are persons concerned about noise, the effects of noise, and what can be done about it. The one man who should be here is not. He is that person who daily works in a noisy environment and whose recreational activities are accompanied by excessive noise. His hearing is probably already impaired or is progressively getting worse because of noise. This is the man who needs better understanding of the problem of noise pollution and what can be done in an effort to protect his auditory mechanism from physical damage.

My purpose in being here is three-fold: 1, To present some data concerning the effects of agricultural noise on the human auditory mechanism. 2, To discuss protective equipment which can be used in ear protection, and 3, to suggest possible avenues which can be taken to promote adequate information and understanding concerning noise pollution and ear protection to those in agricultural environments.

In 1958, Lierle and Reger reported that tractor noise was distributed over a wide frequency range, and was sufficiently intense to produce high frequency hearing losses in tractor operators when they were exposed for long periods of time. Mean sound pressure levels for tractor noise at several frequency bands were determined and reported.

Simpson and Deshayes (1969) reported average intensity readings for 55 tractors and 18 other pieces of farm equipment to range between 97 and 114 dB SPL. Mr. Simpson is presenting a detailed report of this research at this hearing. It is apparent that the intensity of tractor noise in the critical speech frequency range is greater than the 85 dB intensity level Glorig (1964) reported to be the minimum safety limit for noise exposure to human ears.

One may question the total effect tractors have on the individual operator. That is, in comparison with other environmental situations where persons are exposed to noise 8 hours a day during an average 5 day work week, how much effect will tractor noise have on the operator who may not be around his tractor 8 hours a day, 5 days a week. An interesting comparison is that of the total life time exposure of the average farmer to noise with that of the industrial worker. The farmer is one who is generally reared from birth on the farm. He is exposed to his noisy environment at a much earlier age than those in industrial environments. Many farmers start driving tractors and use other farm equipment as early as 10 years of age. Persons in industry usually retire at the age of 65 years, whereas farmers tend to continue working beyond this age; thereby being exposed to a particular noise longer in a total life time.

For the past several years, continuing research of the effects of agricultural noise on human hearing has been engaged in at the Speech and Hearing Clinic, Division of Speech Pathology and Audiology and the University Health Service of the University of Nebraska. By testing incoming new students, employees working at the university agricultural experimental stations, R.O.T.C. students, and persons attending "tractor days", and the State Fair, data has been and is being collected which indicates that the farmer presents hearing problems much like those presented by individuals in other work environments associated with noise exposure. Additional research is now being conducted in determining if there is any correlation with respect to age, percent of loss and total time of exposure between farming populations and industrial populations.

It is obvious from available data that agricultural noise is of damaging proportions, and control techniques should be employed to reduce this noise to a level which will not be damaging to ears. Some industrial areas have made great strides in noise abatement, creating quieter places to work. The agricultural industry is beginning to do the same by producing such items as various sound abated equipment and better cabs for tractors. The distressing aspect of this development is that most farmers are not going to go out and buy a new tractor, combine, corn picker; or install a new cab just to eliminate some annoying noise. If you pardon the pun, it is not considered a sound economical procedure for them to follow.

When the source of the noise cannot be adequately or economically controlled, the use of personal ear protection is the best, most effective method of protecting the ears from damaging noise levels. Ross and Coles (1968) reported individual protection against noise must meet several requirements in order to be considered adequate. In addition to sufficient noise reduction, they must be comfortable to wear, easy to store, easy to place in or over the ear, and relatively inexpensive. Zwislocki (1952) pointed out that individual ear protectors must defend the ears from loud sounds without sacrificing the ability to hear or monitor warning signals and operation of the machinery producing the noise. Considerable concern has been evidenced with respect to the interference with communication presented by ear protectors. Coles and Rice (1965) have indicated that ear plugs can cause a marked difficulty in the speech discrimination of individuals who already have a noise induced hearing loss. They reported that discrimination scores of individuals with noise induced hearing losses were lower than normal without any ear plugs. With the addition of plugs, discrimination was lowered even further.

It would appear that individual ear protectors for the average farmer, for reasons of economics, is the most effective method of protection. However, it does present problems. The farmer, generally self-employed, is exposed to noise from as little as 5 minute periods to 10 to 16 hour periods. He complains that ear muffs are too hot in the summer; ear plugs too irritating after long periods in the ear; not having the protectors with him when he needs them; not hearing his equipment in operation; etc. etc. These statements are not new by any means, but do pose some different kinds of problems not found in other working environments. The age old saying, "I've lived with farm noise all my life, its a part of farming which I just live with", is very true. But with better understanding and guidance, farmers will not have to "just live with it".

Woodburn (1970), while at the University of Nebraska, reported on effective ear protection against tractor noise. The purpose of her study was to evaluate the effectiveness of three different ear protectors (custom made ear molds, ear plugs and ear muffs) in providing maximum protection against the intense noise of tractors, while permitting the most adequate speech reception. The study was concerned with comparing normal hearing persons with noise induced hearing losses. The general conclusion of the study found minimal differences between the effectiveness of the three types of ear protectors used, however, a trend was seen which suggested the custom ear molds to be more effective against tractor noise which does not exceed 106 dB SPL. Above this level, the muffs become the most desirable method of control since maximum attenuation is necessary. Speech discrimination was markedly reduced with all types of protectors. The results of this study indicates that ear protection against noise pollution warrants further investigation.

My final point is to suggest possible avenues which can be taken to promote adequate information and understanding concerning noise and ear protection to those in agricultural areas.

In my research with agricultural noise, I have found a surprising number of people who are not informed about the basic problems of noise and what must be done about it. However, many of the younger farmers in Nebraska are now becoming interested in this area. There are three basic reasons why the young Nebraska farmer is showing greater interest in the area of ear protection. The first is that for the past 8 years, the Nebraska Sertoma Hearing Project, Inc., in cooperation with Sertoma clubs around Nebraska, and the University Speech and Hearing Clinic have conducted free hearing tests at the Nebraska State Fair. This service has provided information about noise and ways of elimination of or protection from noise. It has provided information for further investigation of individual hearing problems; formation of group discussions on noise pollution; and a general awareness of ear protection.

Secondly, the University of Nebraska Tractor Testing Station now provides noise studies on all tractors tested at the testing track, and makes this information available to prospective buyers of these vehicles. And finally, a program is now being developed and tested in various elementary and secondary schools on noise pollution and proper protection of hearing. This project is endeavoring to reach those in agricultural communities at the age when they are beginning to participate in this noisy working environment. The object is to protect before damage occurs.

Like any problem in our society, whether it be the problem of drugs or any of the major pollutents, we must present the available facts, provide stimuli which will enable those at a younger age to build a better understanding of and concern for their health and welfare.

Mr. **Strunk**: Dr. Splinter, I have a very strong objection to one of your conclusions in your presentation, I think we should clear up. First of all, you say that, "therefore, results are not exactly comparable", where you say comparing C weighted scale rather than A weighted values. I would prefer to say that they are not comparable at all, particularly when you are talking about tractors, which has a very high performance at low frequency and the A weighted level decibels. I also take it that your statement that in a short span of 5 years that the sound level has dropped 10 decibels may be overstated. For I look back at the original noise spectra, which you refer to, conducted by Simpson and Deshayes, which gave a 113 dBC value at the operator's ear has its strongest component of 110. Down at 100 hertz and the A weighted level or the A weighted spector decibel varies considerably, so I think there has been very little improvement with the exception of adding cabs to tractors. So I don't think we should pat the farm equipment people on the back and say they are doing a great job.

There has been very little done, I am not saying that because I feel they should have, I think it is very difficult. They have a difficult job to do. But the fact is, they have not made a great improvement or great stride.

Dr. **Splinter**: I don't disagree that there is a considerable difference between the C scale and the A scale. And it is unfortunate in the interim 5 years we have gone from one scale to another as a kind of a general method of measurement. I do feel though, that there have been—this is just from my own observation—there have been significant improvements in the muffling and the design of the tin work protection under the shrouding and so on which have affected sound levels. And it is unfortunate we do not have measurements at our disposal on the A weighted basis to reflect this.

Mr. **Strunk**: I think your statement that they dropped the power for the sound pressure for 10 dB is a gross over-statement. I doubt if it goes that far, even with the muffling which does help. But again, that's a very low frequency. Maybe 3 dB is more in order of what's really been accomplished.

Mr. **Botsford**: I was going to comment on that myself, but Dick has said most of what I wanted to say. I have made a number of measurements in industrial plants of bulldozers, wheel tractors, and also trucks, which have a similar engine noise and I find in an average of several hundred measurements that the A scale reading runs more than 10 dB's below the C scale reading. The average is either 12 or 14, I can't recall which. So then, assuming that that same spectrum consideration would apply to your tractor, that would mean the 100 dBA you measured would be something below 90 or on the A scale?

Mr. **Splinter**: Right, but I also have in here a comparison between 2 tractors, which are idenitcal in horsepower, one of which has a cab and one of which does not. And in this case there is over a 10 B on the scale difference between the 2, so that there are technical means to reduce this noise level.

Mr. **Botsford**: Oh yes, I was going to say, we have for 4 or 5 years been buying industrial tractors and we have been able to get practically all the equipment we buy, it goes up to 1200 horsepower, below 90 dBA at the operator and this is by rather superficial modification, such as holes and putting a dissent muffler on, using a little sound material and the reduction over more than 100 vehicles has been 8 dBA's.

Dr. **Meyer**: Well, what this points up is something that has been plagueing this set of hearings continuously ever since we started, and it is a problem which our report to Congress is hopefully going to highlight. We have tried to simplify things, but in the field of acoustical measurements it is difficult to have reproducible data back over the years with the dBA system. What it highlights perhaps is that that type of approach is very useful for one very meaningful group of specifications of environmental noise, but that one shouldn't get away from taking the third octave and measurements when one is talking about comparison of equipment. I'd like the record to show that this is a matter of real concern and when we get into these substantiation businesses, one has to look at all of these measurements and come up with one that really is meaningful.

That's not denying that the dBA system is not useful, but this case in point clearly shows again, that the public gets confused. In fact, we who are professional in the area, trap ourselves sometimes.

Dr. **Splinter**: If I can interject here, to indicate we take a permanent record on tape on all of our tests so that we can go back, if there is ever any shift in measurement techniques in the future, we can give an octave band analysis for everyone we have made.

Dr. **Meyer**: That's an important point in standards in measurement, I would think. I see some heads nodding out in the audience or among the participants and that's a point I think we will have to take into account. Let me ask first, a couple of questions while we are discussing this with you, sir.

Would you venture an observation? Do you feel that the existence of this testing system under the State of Nebraska's support has had an influence in producing the expression of further interest—has this been an influence in stimulating interest?

Dr. SPLINTER: Yes, I can clearly indicate this because as I say, we have an advisory group of farmers and when we brought this information to them about hearing loss hazard, they became very interested in having us include this in the test procedures. We have also, a very active program in trying to bring this information to the attention of farmers throughout the state. And each of our—we sponsor a power and safety day each year in which we attract from 10,000 to 15 or 20,000 people. And one of the major features in this power and safety presentation is the stressing the problem of hearing loss hazard and this sort of thing, and I think this is reflecting back an awareness when farmers are purchasing equipment that they need to keep this in mind.

Dr. MEYER: Then that might be a way of focusing some interest in this sort of thing, also some of the other things, competition meets on mowers and snowmobiles. I think I will discuss that further with both of those industries, which have already shown they have done a fair amount of work.

I would like to ask Mr. Deshayes several questions. I'm quite interested in finding out more about the details and numbers of audiometric records and how far back they go. You say they had to go to a computer?

Mr. DESHAYES: The screening records that we have on hand, I think probably we have oh, for the last 10 years or so, that we do have records now of those people who failed the tests. These records in the past have been a little difficult to get because at that time we were not concerned about this particular area and so for us to go back and get this, this is where it is going to be difficult because it is in two different places. Some of it is in the University Health Service, some we had to go back and look into the medical records themselves. And we went back and redid the test and did a good audiometric evaluation on that.

Dr. MEYER: The other question I have is pertinent to this and I think you may see why I'm interested. Do you know of any noise level studies in the State of Nebraska which might correlate with some of this mass of data? Have there been any studies made of noise levels in rural communities and your areas, such as Omaha and Lincoln?

Mr. DESHAYES: What type of studies?

Dr. MEYER: Actually sound level measurements to get some idea of the residual or ambient noise.

Mr. DESHAYES: No, I don't know of any at the present time.

Dr. MEYER: The thought occurred to me—one of the things we are concerned about is finding out just exactly what a "quiet" environment might consist of.

Mr. DESHAYES: Like has been stated by a couple of people here, out in the lobby from yesterday and today, there have been a lot of good ideas that we are all going back and start thinking about.

Dr. **Meyer**: That's the purpose of this hearing. If you are doing one thing in the University and you have got an interesting situation in Nebraska and Colorado, both of which I am familiar with, it may be that we will want to get together with you and look into it further. Thank you gentlemen for appearing.

At this time, I would like to call on Mr. Arnold A. Skarjune.

STATEMENT OF ARNOLD SKARJUNE, WHITE FARM EQUIP. CO.

Mr. **Skarjune**: Gentlemen: My name is Arnold A. Skarjune. I am a Product Engineer for the White Farm Equipment Company, which includes the Oliver Farm Equipment Company, the Minneapolis-Moline Division and the White Farm Equipment Division. I welcome this opportunity to appear and discuss the subject of noise on the American farm.

During my many years in the agricultural field, the design and production of farm tractors have changed dramatically. I remember when some people thought that the loud bark of a tractor engine was a good indicator of machine power. These thoughts were rapidly changed by the tractor manufacturers because of their interest in the health and welfare of the American farmer.

Operator comfort was one of the early titles given to one area of the tractor which included the efforts and progress of noise reduction at the operator station.

This is the task I now undertake that is to provide you with a short history of the progress made in noise reduction at the operator station.

The White Farm Equipment Company, with the cooperative effort of a cab manufacturer, set out to produce a modular concept tractor cab with the requirement that the sound level shall not exceed 90 dBA at the operator's ear. Other tractor cab specification requirements will not be discussed here and I will address myself only to the achievement of low noise level at the operator station.

Research and testing in the early 1960's on tractor cabs confirmed that a major source of noise was airborne in nature and was transmitted through openings in the tractor cab. Mechanically transmitted noise was also established as a noise source in tractor cabs resulting in the introduction of isolation mountings.

Through accumulative research, the following factors were considered for the purpose of reducing noise at the operator station:

Design Factor	*Noise Reduction*
Modular concept	Airborne noise
Isolation mounts	Structure-borne noise
Non-parallel sides	Reverberating noise
Isolated roof	Reverberating and structure-borne noise
Acoustical headliner	Reverberating noise
Floor mat	Reverberating and airborne noise

Testing of the tractor cab was conducted on an A4T 1600 Minneapolis-Moline tractor.

Slide. 1. This is a graph showing the sound attenuation resulting from the cab isolation mounts as compared to the cab when it is rigidly mounted to the tractor. When the tractor cab was rigidly mounted, the sound level is 91 dBA and with the isolation mounts, the sound level is 85 dBA.

Slide 2. Here is a graph that shows the effect on operator station sound level when the floor mat is omitted from the tractor cab. With the floor mat installed, the sound level is 85 dBA and with the floor mat removed, the sound level increases to 89 dBA.

Slide 3. A comparison is shown between the noise level for an average two-wheel drive tractor with cab, as published in the SAE Transactions, Volume 79 (1970), Paper #700703 entitled, "Sound Level at Operator's Station of Cab and Non-Cab Equipped Tractors", and the modular cab. It can be observed that the modular cab is significantly quieter than the average cab with a fairly uniform sound reduction of approximately 9 dB in each octave band.

Slide 4. A final graph shows the noise level of the tractor cab as compared to the Walsh-Healey Act Federal Register, Volume 34, No. 96 (May 20, 1969), Washington, D.C. and the noise level standards in SAE J336 Recommended Practice, Sound Level for Truck Cab Interior.

Slide 5. Here is an overall view of the modular tractor cab used in the noise level evaluation tests.

Slide 6. This is the tractor with the modular cab installed. This tractor was evaluated in official tests at the University of Nebraska Agricultural Station, Lincoln, Nebraska. The sound level at the operator's ear was recorded at 87.5 dBA under 100 percent load and full-throttle operation.

The data I have just covered shows the achievements in noise reduction in one area of one farm machine. This is typical of the research and development that is constantly being done in different component areas and on different farm machines. Information of this nature is published through our industry associations and societies to provide continuing research.

Designers, engineers, and those involved in manufacturing no longer work only toward the function of the product but must also be aware of the safety, the health, and the welfare of the consumer. Self-discipline in our industry has and continues to provide great achievements in the area of noise reduction of farm machinery for the benefit of the American farmer.

In conclusion, I would like to emphasize that changes to produce farm machinery with low noise emission has accelerated dramatically. Voluntary standards in our industry is a working system to improve the degree of personal health and welfare for those involved in the normal operation of farm machinery. Cooperation should be established between the Federal agency authorities and industry to continue voluntary progress in the area of noise reduction on farm machinery. Thank you.

Mr. **BOTSFORD**: Does that cab have to be closed up at this time to get the 87 dBA noise levels?

Mr. **SKARJUNE**: No, it is not a sealed unit, as you would think of as a refrigeration unit.

Mr. **BOTSFORD**: I noticed it has some windows that could be opened, were those closed during the tests?

Mr. **SKARJUNE**: They were closed, yes.

Mr. **BOTSFORD**: Did you take any tests with them open, as it might be used in warm weather?

Mr. **SKARJUNE**: There may have been, I don't have any data here.

Dr. **MEYER**: Thank you very much sir, we appreciate the further information on the state of the art. That's one of the things we are trying to find out.

The Chair would like the record to show that Professor Gatley provided the Environmental Protection Agency with a copy of a recent study concerning regulation of noise in urban areas, prepared by his department and it is a very excellent document, which will be useful to us in our studies in this area. Dr. Gatley, would you come forward please?

STATEMENT OF WILLIAM GATLEY, UNIV. OF MISSOURI ROLLA

Dr. GATLEY: Mr. Meyer, members of the panel and participants, my name is William S. Gatley of the University of Missouri at Rolla and I appreciate the opportunity to provide some testimony here. I have one advantage over earlier speakers and that is they have extracted almost every point that I intended to make. So, I won't bore you with further details. I think there are a couple of additional things I could offer.

Dr. MEYER: If you would like to have your paper submitted for the record, the paper will be printed after your remarks.

Dr. GATLEY: The first part of my summation is the general noise problem, as I see it, based upon our acoustical program at the University, which is about 6 years old now and I won't go into those details, but there are 2 important concepts I think that need to be dealt with in any program to reduce noise across the board, as we are attempting to do here and specifically in agricultural and recreational areas. And that's the importance of practical and enforceable regulations.

Based upon this study, to which Dr. Meyer just referred, we have found that there is one thing that seems to impede the progress of noise reduction. We would like to recommend basically that regulations have to start at where we are now. Admittedly they may not be satisfactory, but at least they will be better than nothing and they can be enforced and future levels could be based upon new technology and further developments, which will aid in reducing levels to perhaps what we might consider more acceptable or more optimum levels.

And, secondly, I would like to emphasize and expand slightly on the importance of the fact that this has got to be a cooperative effort and one thing I'd like to discuss is something that I am probably more qualified to discuss than the other elements. That is the role of the University in this cooperative effort. It has been mentioned many times that there are two different types of noise legislation that we are following. One has to do primarily with preservation of hearing and perhaps with the preservation of sanity and the quality of life. In the latter area, we have many regulations that came out of our study and you are familiar with those regulations that pertain to noise in residential areas. Primarily as a result of City, County and State Ordinances.

These apply to specific items in some cases, such as air-conditioning systems, automobiles, construction equipment and so on. There are regulations pertaining to noise in commercial and industrial areas. These are primarily levels specified at property lines. The thing here being that a person has a right to produce any noise that he wishes on the property, just as long as it doesn't restrict the rights of others who may lie adjacent to him and there are regulations pertaining to aircraft and airports. The Federal Aviation Agency enters into this by its certification procedures and airports themselves have their own regulations in many cases.

Another category is noise from motor vehicles, in which California is probably ahead, but Connecticut and New York and many other states are also active in this area. A fifth category would be noise in buildings. Little is done in this country, much more is done in Europe. Primarily because of the need to better control the noise levels between party walls of adjacent walls, which are much more common in Europe than they are here.

Drafting and enforcing all of this legislation is a very difficult task. Simply because there are so many variables involved. But generally speaking, there have been two specific types of approaches. One is the nuisance ordinance, which attempts to regulate or control loud or annoying noises and these have been subjectively evaluated and are commonly applied in the laws themselves to apply to a person of normal sensitivity. So there is a problem here in that there is a subjective evaluation required. We feel that the nuisance factor still has a very strong role to play in any overall noise regulation scheme, simply because it can take into account those occasional and perhaps intermittent types of operations which result from improper operation or perhaps improper usage and operation at certain times of the day or in certain areas.

We feel that this has a specific role that needs to be preserved and it will probably continue to be applied primarily on a local level.

Another type of noise control legislation is the Performance Code, which has been discussed in great detail here. There are 2 different types. One has to do with certification of new products and the second type has to do with the control of operations, such as drive-by tests and normal use type of noise levels. So, we have a situation here that requires different types of regulations and it is complicated by at least 2 factors.

One is, what are acceptable noise levels. Well, sensibilities vary greatly between individuals and their activities and if these levels are set in too literal a fashion, then the legislation simply fails to accomplish the intended objective of reducing the level. And if the permissible levels are too restrictive, then the legislation is unenforceable and usually employed only as a threat. And the State of Missouri has several examples of this on the books. I don't believe it is helpful in reducing the existing noise level to any significant extent.

And the next point has also been elaborated on. What criteria should be employed to evaluate these noises? DBA seems to be the primary choice simply because it is easy to measure, doesn't require extensive analysis. But, there may be other criteria that will come about in the future and any program of regulation should have this possibility built into it, that is that new and better criteria will come into existence.

I would like to make a few comments as to what we see for a set of agricultural and recreational noise. First of all, I would agree with many previous statements that agricultural noises, primarily, although not exclusively, is a problem of potential hearing loss for the operator. On the other hand, the problem of recreational vehicles involves both this problem and perhaps a much larger problem of perhaps of potential annoyance and particularly in recreational and suburban areas where the activity levels are lower to begin with and therefore, the levels resulting from operations of recreational vehicles are sensed much more directly, simply because the levels represent a significant excursion above the ambient level and secondly, people may be somewhat more noise sensitive in these areas, because many of them are there because they wantd to get away from the noise in the city. So, I think it is a much more serious problem than the number of vehicles themselves would tend to indicate at this time.

I have also discussed previously, what we consider to be some of the common sources and certainly this has been covered in great detail and I won't go into it any further, other than to mention it is included.

Now, a few statements to conclude concerning the control of agricultural and recreational use noise. We feel that it has to be a cooperative effort and furthermore, I feel that many of these comments in here can apply to other types of noise, other than just agricultural and recreational. All segments of our society have contributed to the noise problem that we have in general, and to the agricultural and recreational noise in particular.

Attempting to assign relative amounts of blame to one segment or another is unproductive, if not impossible. Industry has failed to institute noise reduction at reasonable cost, Government has failed to establish uniform and feasible regulations to temper the economic system that is responsible for the increased leisure time. The University, and I can speak to this with some additional authority, the universities have failed to provide the training needed to implement effective noise control programs and finally, the buying public has failed to recognize, not only the demarcation between freedom to produce noise and infringement upon the rights of others, but also the restrictions imposed upon individual activity by a growing populace and increased standards of living.

Just as this noise problem has resulted from a combination of industrial, governmental and academic public neglect. So, I believe its alleviation requires a combined and cooperative effort of these same groups. A realistic evaluation of the present situation, future trends, applicable technology, regulatory measures and cost is needed. As I see it, specific responsibility for this program might be assigned as follows.

The principal roles of industry would be reduction of noise by modification, redesigning or enclosing the source. Something can be done immediately, as has been pointed out and probably at minimal cost. Other steps require significant redesign and will have to wait for a generation of new products and still other sources. We simply do not have the technology to perform the desired functions with lesser noise levels at the present time. And they will be much longer in their reduction.

The role of Government, as I see it, is to educate and inform the general public as to the purposes and procedures for regulation of noise and I notice this has been brought out many times previously today. Secondly, the role of the Government would be to formulate effective and enforceable regulations at the local, state and national levels, in cooperation with industrial trade associations and professional societies. And again, this has been mentioned many times today.

In connection with using accepted standards of SAE and other organizations, it would mean that the regulations have to be realistic for the time in which we live and for the technology available and for the cost of the people to pay. At the local level of Government, it seems to us that a combination of noise, nuisance ordinances and perhaps performance criteria for typical operating conditions would be the best combination. This would leave the task of certification of new equipment to either the state or preferably the Federal Government, as has been indicated to be desirable by other people.

These noise nuisance ordinances would specify, not only the type of operations, but also perhaps might restrict certain operations as to hours and locations, as well as type of operation.

As far as the role of the university is concerned, we have a small but very active program at the University of Missouri at Rolla, involving course work for graduate and undergraduate levels. Seven graduate students and a number of continuing education programs are geared to execute constructive programs to improve standards and reduce noise levels through applied research, and train engineers and technicians in the principles and practice of noise control. This latter facet was brought out by a number of people and I think this is, perhaps, one reason or area in which the university can offer the greatest assistance and this is the type of continuing education that many people seem to want, because we have considerable experience at our university, for example, in offering these courses. And they can be offered either at the university or perhaps, in a separate area that might be more easily reached by the specific type of person you are attempting to inform.

So, I think there is a great potential here, which will do two things. Hopefully, help to reduce or solve some current noise problems and also educate students who will then be able to solve the next generation's noise problems. As the cooperative performance of this research on university campuses continues, we are equipped to do a great deal of noise control work and contrary to what you might think to be the case, our interest is primarily in applied research to solve specific problems. We do have considerable background in the theory and application, so that I think that we may be in a good position to assist industry, and particularly small industries, who might not have the resources themselves to solve these problems.

The cost of these programs would be shared to various degrees, by industry, Government and the university. And that could be worked out on a grant or individual project basis. There are many different possibilities here.

On the part of the public, I think there is a tremendous amount of education needed here. The public has to have a willingness to cooperate with industry and government through proper maintenance, operation and use of agricultural and recreational equipment, as well as other types of noise producers. And two very important aspects of this, and perhaps three, are respect for the rights of others on the part of the public. Perhaps what we might call even civil pride in keeping a residential or other area quiet, and also a feeling of satisfaction and responsibility are essential to the success of this effort.

The way I look at it is that no amount of regulation is really going to create the type of environment we would like to have unless the public is willing to support it. So, in conclusion I feel that the technology and incentives to achieve significant reductions in agricultural and recreational noise are available now and more will be available in the future. This goal can be best reached through the determined and cooperative efforts of all segments of the society. Thank you.

WRITTEN STATEMENT BY WILLIAM S. GATLEY, Ph.D.

The general "noise problem" and the relative importance of agricultural recreational use noise are briefly discussed. Principle sources of agricultural recreational noise and noise control measures are described. Various types of regulatory measures are enumerated. A comprehensive program involving the cooperative efforts of industry, government, universities, and the public is recommended for the effective control of agricultural and recreational use noise.

Noise has recently been labeled the fourth pollutant and defined by some as the "unwanted sound" that pervades our work environments and the privacy of our homes. This concern for noise and its effects has resulted due to our nation's increasing population density, the increasing use of mechanized conveniences, the influx and growing use of mass transportation systems and the public's awareness that noise not only "annoys" and can increase everyday tensions and anxieties but at certain levels can cause permanent hearing loss.

In order to curb the noise problem, legislators and public officials have begun applying legal controls to noisy activities and machines. Noise legislation is usually written to accomplish one or both of two objectives: to minimize loss of hearing and/or to reduce irritating or annoying noises to acceptable levels.

The Federal Council for Science and Technology has stated that at least a million workers now living suffer from some degree of deafness. Estimates are that another 6 to 16 million are exposed to noise levels which may cause eventual hearing loss.

Examples of legislation designed to reduce deafness are the Walsh-Healey Act Amendments (1969); provisions of the Occupational Health and Safety Act of 1970 (this act applies the Walsh-Healey noise exposure limits to all businesses in interstate commerce) and a number of state laws, most of them similar or identical to federal legislation. Noise exposure limits specified are based on studies of thousands of workers over the past 20 years.

A second major objective of noise legislation is to reduce irritating or annoying sounds (primarily in urban areas) to acceptable levels. Restrictions are usually in the form of city, county or state ordinances and regulations in several categories.

1. Noise in residential areas, including sources within such areas (air-conditioning systems, automobiles, construction equipment, etc.) as well as noise produced at residential area boundaries from external sources.

2. Noise in commercial-industrial areas, primarily at property lines between adjoining businesses and at boundaries between areas zoned for different uses.

3. Noise from aircraft and airports, including landing, takeoff and taxiing. The Federal Aviation Administration has specified permissible noise levels at or near airport facilities for individual aircraft, while local regulations attempt to control number of flights and use of runways.

4. Noise from motor vehicles, including certification of new models. California and Connecticut are examples of two states with legislation specifically designed to control freeway noise.

5. Noise in buildings, especially between adjoining units in multi-family dwellings. Materials or performance levels are specified for party walls, floor-ceiling constructions and other noise paths.

Drafting and enforcing fair, effective legislation to control irritating or annoying noises is a difficult task. The provisions have generally taken the form of nuisance ordinances which restrict or prohibit certain activities or the use of equipment such that they do not create a noise nuisance to the surrounding area. The nuisance ordinance has been effective in many instances, but the subjective analysis inherent in its application has resulted in a questioning of what is unnecessary, unreasonable or unacceptable.

A relative newcomer to noise control legislation has been the performance code. This type of ordinance incorporates maximum noise levels in decibels that are permissible at a given location. The objective criteria of performance codes have given relief from the subjective connotations of the noise nuisance ordinance. However, determining noise levels that are realistic, equitable, acceptable and enforceable for a given community needs special and careful consideration.

In summary, the control of urban noise is complicated by 2 factors: 1. What are acceptable noise levels? Susceptibility to annoyances varies between individuals and their activities. If the permissible levels are too liberal, the legislation fails to accomplish its intended purpose. If the permissible levels are too restrictive the legislation is unenforceable and is usually employed as a threat only in extreme cases.

2. What criteria should be employed to evaluate given noises, and how should measurements be obtained? The A-weighted sound pressure level is easiest to measure, but is not a uniformly good indicator of annoyance for all classes of noise. Octave band criteria may be more accurate for assessing annoyance, but are more time-consuming, costly and difficult to employ.

Agricultural and recreational use noise is one aspect of the general problem just described. Although neither activity is primarily associated with the urban areas, the effects from agricultural and recreational noise exposures are at least as significant as those from exposures to similar noise levels in urban areas.

Agricultural noise results from operation of mechanized devices for producing and processing crops. Although numbers of farm workers are decreasing, those remaining are exposed to generally greater noise levels over longer periods of time. Both of these phenomena result from a common cause—greater use of machines increases productivity per worker. Therefore, less farm labor is needed because more of the work is performed by machinery, which also produces noise as an unwanted byproduct of its primary function.

Agricultural noise can be hazardous if it interferes with communication or exceeds damage risk criteria for hearing loss. Thus protection of operators is the primary objective of noise control measures and reduction of noise levels in surrounding areas is rarely a relevant consideration. The principal noise sources are engine exhaust, hydraulic pumps, cooling fans, blowers, and mechanical impact. Improved exhaust systems and the use of sound barriers can appreciably reduce some of these noises at reasonable cost. Other sources are far more difficult to control and may require extensive modification or complete redesign of the noisy machine or component. In some cases there is no known alternate method for performing the desired function with less noise. Therefore, a period of ten or more years will be needed to accomplish significant across-the-board reductions in agricultural noise, although specific improvements are possible now or in the near future (several farm implement manufacturers are pursuing programs to reduce equipment noise at reasonable cost).

Recreational noise is associated with a growing number of land, water and air vehicles, invariably powered by internal combustion engines that are used in leisure activities. These vehicles include, but are not limited to, motorcycles, mini-bikes, snowmobiles, off-road wheeled vehicles of all types, air-cushion vehicles and motorboats. Many of these vehicles are operated in urban areas, where they contribute to rising ambient noise levels and often produce identifiable excursions above the ambient level. However, the annoyance caused by operation of these vehicles is experienced at least equally in rural and recreational areas, where many vacationers and permanent residents go to escape the noise and pace of urban life.

A further aspect of recreational vehicle noise is the potential for eventual hearing loss among vehicle operators. Engine exhaust, often inadequately muffled, is frequently the principal source of noise. In many cases, manufacturers have failed to include reasonably quiet operation in their requirements for a saleable product. This statement also applies to users, some of whom deliberately modify the original exhaust system to create even more noise.

The apparent conflict between preserving environmental quality and the largely uncontrolled use of recreational vehicles is becoming increasingly volatile.

"Critics are asking especially whether the fun enjoyed by a relatively small number of off-road-vehicle users is worth the damage they cause to the environment."

"Our growing population, greater affluence and shorter work hours have combined to increase the leisure time use of recreational vehicles and powered equipment. This in turn increases the noise from such products to a noticeable degree and raises the question of what can reasonably be done to decrease this unattractive products characteristic."

All segments of our society have contributed to the noise problem in general and to agricultural/recreational noise in particular. Attempting to assign relative amounts of blame to one segment or another is unproductive and futile, if not impossible. Industry has failed to design in effective noise control at reasonable cost. Government has failed to establish uniform and feasible regulations to temper the economic system responsible for increased leisure time. Universities have failed to provide the training needed to implement effective noise control programs. Finally, the buying public has failed to recognize not only the demarcation between freedom to produce noise and infringement upon the rights of others, but also the restrictions imposed on individual activities by a growing population and an increased standard of living.

Just as the noise problem has resulted from a combination of industrial, governmental, academic and public neglect or indifference, so its alleviation requires a combined and cooperative effort. A realistic evaluation of the present situation, future trends, applicable technology, regulatory measures, and cost is needed. Specific responsibilities for a cooperative program to control agricultural and recreational use noise should be assigned as follows:

Industry: Reduction of noise by modifying, redesigning or enclosing the source. Cost will be a major factor, but significant reductions in the present noise levels of many types of agricultural/recreational equipment appear feasible at a cost increase of 10 percent or less.

Government: Educate and inform the general public as to purposes and procedures for regulation of noise. Formulate effective and enforceable regulations at local, state and national levels, in cooperation with industrial trade associations and professional societies.

"As more corporations examine their operations in terms of environmental considerations and as they communicate what they learn to the public, I feel confident that better understanding will result. No business, no group of businesses, acting alone, can do the job that has to be done in our cities and communities. If the job is to be done, it must be a cooperative effort. All segments of American society must be involved. But the leadership and direction must come from government. When we, as citizens, allow government to falter in its obligations to any segment of the community, when government fails to provide constructive leadership, the quality of life in the entire community suffers. And government won't provide the necessary leadership in the areas I've been discussing unless it has from the public a political mandate for a different set of social priorities."

At the local level a combination of noise nuisance ordinances and performance criteria for typical operating conditions are recommended. The noise ordinance recently adopted by the City of Chicago sets forth the following limits:

Motorcycles	Noise Limits, dBA (measured at a distance of 50 ft., according to standard test procedure)	
	35 mph or less	over 35 mph
before Jan. 1, 1978	82	86
after Jan. 1, 1978	78	82
Recreational Vehicles (operated on residential or business property)	Noise Limits, dBA (measured at a distance of 50 ft., according to standard test procedure)	
before Jan. 1, 1973	86	
after Jan. 1, 1973	82	
Engine Powered Boats	Noise Limits, dBA (measured at a distance of 50 ft., according to standard test procedure)	
before Jan. 1, 1975	85	
after Jan. 1, 1975	76	

At the state or, perhaps better, national levels, uniform performance criteria for new agricultural/recreational equipment are essential to any program for effective noise regulation. (The President's proposed 1971 Noise Control Act (S.1016) authorizes the EPA Administrator to establish performance criteria for agricultural and recreational vehicles.) For example, the following limits are specified in the Chicago ordinance:

Motorcycles	Noise Limit by dBA
before Jan. 1, 1973	86
after Jan. 1, 1973	84
after Jan. 1, 1975	80
after Jan. 1, 1980	75
Agricultural Tractors & Equipment	
after Jan. 1, 1972	88
after Jan. 1, 1975	86
after Jan. 1, 1980	80
Snowmobiles	Noise Limit by dBA
after Jan. 1, 1971	86
after June 1, 1972	82
after June 1, 1974	73
Dune Buggies, All Terrain *Vehicles, Go-Carts, Mini-Bikes*	
after Jan. 1, 1971	86
after Jan. 1, 1973	82
after Jan. 1, 1975	73

Note that limits are established through 1980, in order to allow manufacturers sufficient development time for compliance.

Universities: Coordinate and executive cooperative programs to improve standards and criteria, reduce noise levels through applied research, and train engineers and technicians in the principles and practice of noise control. The cost of these programs would be shared to varying degrees by industry, government and universities. In this way universities could contribute to the solution of an important national problem, particularly by making their resources available to smaller companies at reasonable cost.

Public: Willingness to cooperate with industry and government through proper maintenance, operation and use of agricultural/

recreational equipment. Respect for the rights of others and civic pride are essential to the success of this effort.

The technology and incentives to achieve significant reductions in agricultural and recreational noise are available now. This goal can best be reached through the determined and cooperative efforts of all segments of society.

Dr. **MEYER**: Thank you very much. As you rightly said, a good bit of the comments you made in your, an overview of the problem of control and who has responsibility really applies to the total noise problem. I think you really have given a very good capsulization and statement there, which we may want to use from time to time with credit to yourself. Are there any comments from the panel?

Dr. **BERRY**: I'd like to, if you are prepared to have me put words in your mouth, I would like to suggest that you think that every engineering college should have a required course in noise control, which would be available to chemical engineers, mechanical engineers, all engineers? Are you prepared to go that far?

Dr. **GATLEY**: You are going to get a very biased answer, otherwise, I'd be glad to comment. I feel we are to the point in the development of our society where acoustics—and if you want to abbreviate it to noise control—is as much a part of any engineering curriculum as, for example, heat transfer or thermodynamics and you do have to be realistic and recognize the fact that this coverage cannot be excessive. It has to be weighed relative to other disciplines that are still essential. But I feel that just as the changing needs of society become apparent, so the university has to change as well. I think that there is, not only a crying need, but a desirability of including this type of training and it fits in with almost any engineering discipline.

Dr. **MEYER**: Thank you very much, sir. I should now like to call on Professor David I. Cook to come forward and give us his information on the potential of trees and shrubs for recreational noise control, which is, I might add, a controversial subject to some people. Before you begin, Professor Cook, before some of the participants leave, I would make the observation for the record that the testimony with regard to the agricultural industry received so far, clearly indicates that perhaps the Federal Government, through a coordinating effort, will have to look to the possibility of stimulating an industry—government volunteer effort, as well as to begin consideration to the actual needs for the standards.

I won't prejudge which way we ought to go, but it certainly is clear this is an approach that needs to be examined. Would you proceed, please sir.

STATEMENT OF DAVID COOK

Mr. **COOK**: Members of the panel, ladies and gentlemen. I do consider it a privilege to be invited here to appear at this hearing and while I am not specifically an expert in agricultural or recreational noise, we have recently completed a three-year study of the use of trees and shrubs for noise abatement.

Now, I have passed out to you what I hope will be the official transcript of this statement.

Dr. **Meyer**: It will be included. Are you indicating you propose to summarize this?

Mr. **Cook**: Yes, this one and additionally research bulletin 246, which you can use in any way.

Dr. **Meyer**: Your statement will be included in the record and we will have to take a look and see how much we can include in the total transcript. Otherwise, it will be indicated that it is available as a reference.

Mr. **Cook**: I also would like to give public recognition to Dr. David F. Van Haverbeke, who has been my associate in this study. The name appears on the bulletin but does not appear at the heading of the paper, so I would like to do that.

I would like to play for you some of the noises that are causing our problem and see how they come out through here. Many of these noises have been mentioned in the previous testimony and I'm sure you recognize them. They are mostly outdoor noises. You are aware, I'm sure, of the tremendous advance that has been made in the control of indoor noises and I won't go into that at all. But, outdoor noises are a different problem. It is much more difficult to control the varying surface conditions, the various terrain, the atmospheric conditions vary from day to day and from hour to hour and make it very difficult to study the problem and control and measure. It has been one of our biggest difficulties in the study.

Now, we have used primarily pre-recorded tape noise and taken it to the places where the trees are. I think I should let you hear the types of noises that we did use, so I will play those for you also.

(Whereupon, Mr. Cook turned on a tape recorder.)

Mr. **Cook**: That is a large truck on Interstate 80, west of Lincoln. This is a 40-mile an hour traffic on East O Street in Lincoln. A bus-stop at 13th and O Street in downtown Lincoln.

Dr. **Meyer**: Professor, as you see, I have a sound level meter here and obviously you have got the volume turned down on your machine. If I recollect correctly, that traffic noise at the intersection is somewhere around 80-85 dBA, go ahead and turn it up and let the group, the faithful followers who stayed, listen to it.

Mr. **Cook**: I will back it up just a short distance. This is downtown Lincoln. Those were the noises that we used in our study and I would like to describe the method now. If you will dim the lights a little bit—incidentally this is Dr. Van Haverbeke, who is adjusting some of the equipment. You can see various components here, which I am sure are familiar to many of you. The lower is the low frequency section and the high frequency is shown above it.

We carry our own power supply out and projected this sound through the belt of trees and shrubs, one of which you see here—this is a well-developed belt, consisting of about 10 rows of mixed conifer. We look at the schematic cross-section of the belt now. This describes it, it is 100 feet deep and 45 feet tall and I won't describe the various types of trees within it, but simply say that the front row is the conifer, followed by the deciduous trees.

We measured the sound levels behind the belt at various distances, ranging from 25 to 300 feet, and this again, is Dr. Van

Haverbeke recording the readings on the sound level meters and at the same time, making a tape recording. You can see the windscreen on the tripod, which covers the microphone. The white string standing out does indicate the wind is blowing there and that made it an absolute necessity. Wind is a major problem in measuring outdoor sound.

Now, the second series or part of the experiment consisted in measuring at the same distance from the noise source, the sound level over almost identical terrain except devoid of trees and in this case by being very careful of using identical procedures and surface and wind conditions. By doing it almost immediately after we were able to eliminate practically all the variables and evaluate by comparison, the sound with and without the trees. That briefly outlines the procedure.

Here are some quick slides of some of the other belts used. A very dense belt of dead cedars, not as long as the other one, but very effective, nevertheless. 63 feet versus 30 feet. This is a pure conifer stand. Another one, a smaller belt, not as deep or tall, but it did give some results, not particularly effective, I would say in this case. Here is the cross-section of it.

Now, I'd like to give you some of the results of the tests which are in graphic form. They appear in the paper as well as in the report itself. First, may I call your attention to the theoretical curve, which is the inverse square curve from a point source and you may use it as a reference in looking at the curve. The next curve, I'd like to ask you to look at is what we call the control test curve, over the treeless area. Not too far from the theoretical curve. Below that, we have 3 curves of the levels of the truck, bus and arterial auto noise shown. Now, only the control test for truck noise is shown on this graph to eliminate too much confusion with other lines. So we limited it to that one control test. You are aware of the type of graph we have here, so I won't describe it, simply to say it differs in its height of the control test and accordingly the tree curve or truck noise represents the reduction or continuation in sound level all on the dBA scale and this reduction is shown in the graph below.

Now, those results are, I won't say exceptional, but some of the best that we were able to get. Most of our results are not this good and so if I had a more typical slide, I would have brought it along, but this was the only one that I had at the time. But I do want to clarify that point. It became apparent very early in our study that the type of surface over which the sound passed, made a great deal of difference in the noise level at the various distances. So, we undertook a second study the second summer using only truck noise and these are the results of it. Again, in graphical form.

Once again, you see the theoretical curve not too far distant from the gravel surface curve and above a very hard surface curve or paving curve. You might conclude there has been some reflection from the paving. Very likely we think that is the case. Below it, also, you see the rather plain ground surface curve, which would be a soft soil surface and finally the trees and ground combination curve, which is, as you can see, better as far as the noise level is concerned than any of the other surfaces.

And then below again, the attenuation curve where we have what we call a range of attenuation, simply meaning when the comparison with trees and ground is made with different surfaces, you can expect results to be within this range.

The best effect is, of course, when it is compared with the hard surface and the least effect, when it is compared with the softer ground surface.

This is the second type of study that we undertook then. We did make some studies with noise in the city and we used both our recorded sound and some actual live sound of passing vehicles in these. This is one of the noise screen areas that we use. This is a shrub known as a caponey astor, with a few little other shrubs sprinkled in these and some pine trees in the background. This is, as we see, this represents a rather narrow belt and we got what appears to be rather spectacular results.

Now, you see again the theoretical curve and the curve and the actual curve above it. We used both the bus noise and the automobile noise, but not the truck noise in the town study. There is apparently amplification here, which is due to the nature of the projection and the reflection from the street on which we ran the control study. In this particular projection, the equipment was placed at street level to try and approach as nearly as possible, the actual conditions for car noise sources where the majority is due to roadway interaction and exhaust noise. So that the 150 dBA reduction you see in the lower curve could not, in any sense, be considered as what you could expect to find due to simply planting a few rows of trees in your backyard and this is explained in detail in the final report. But I wanted to point it out here.

We are now in the process of a new study, which I will mention briefly, which is entitled, Short Term Programs For Noise Abatement, using forested land forms. This is an artifical land form that was built this summer and it is 16 feet tall, it is about 300 on the portion you see and a similar portion extends within the tree belt that you see on the right of the slide.

Now, we removed the trees from the center of the belt. They were mostly dead, due to Dutch Elm disease, so we didn't have, so to speak, too many trees to put this thing in, but we have, if you will notice carefully, staked out the area behind the land form, with a series of flags and we are making measurements of both traffic noise, live noise and our recorded noise as well. Here is another quick shot of the land form. This is another area which is on Interstate 80, northwest of Lincoln. The small rises, a little larger than appear here—you can notice the truck on the left side of the Interstate Highway and on the right, the rest area, which is receiving considerable protection from the noise of the trucks.

Here is a closer shot, giving you a better idea of the size of the little hill. This was left in there at the—over the objection of the State Engineer by the Highway Engineer, who likes to have it here. Here is one more shot, more of an advertising nature, showing the rest area and the Platte Valley behind it.

Now also, we are looking at a few in-town areas where there has been planting of trees, mostly for view purposes, but which appear to be helping with the noise problem as well. This is the other one taken from the pole that Dr. Van Haverbeke had to climb. These, I think, are illustrations of how trees and shrubs may be of use to solve some of the recreational and noise problems. They are certainly not the complete answer, but we do think from the reduction we can get, it might be possible to bring noise from an objectionable level down to one which is not objectionable.

I might return to the No. 9 slide, if I can here, and let you hear a comparison of the noise levels with and without the trees. Now, due to the acoustics of the room and other factors, which I'm sure the panel is aware of, I can't claim these are exact, precise comparisons of the noise on the graph, with what you will hear at your particular location, so I want that to go in the record. But they are the best I would do and the recording equipment that recorded them, measured them to the point where they would be accurate in that respect.

The sounds, the noise is first heard with no trees present and it is then represented behind the trees, both recordings at the same distance from the noise source. Five micro positions of 25-50-100-200 and 300 feet, at the edge of the belt were used. The first distance is 25 feet. The next, 50 feet, 100 feet, 200 feet, 300 feet. I would be interested to know what your sound meter showed over there.

Dr. MEYER: Well, we are reasonably close to your curve, right around 85 dB at your upper and 70 on the lower ones.

Mr. COOK: Thank you. I believe that concludes—

Mr. MEYER: Could we have the lights please?

WRITTEN STATEMENT OF DAVID I. COOK

Our National parks, playgrounds and out-of-door recreational areas are becoming noisier. How much we do not know. But, if it parallels national increase we can say with assurance that they are four times as noisy as they were 20 years ago. Extensive mechanization of agriculture and increased traffic volume and speed have played a major role in the increased noise level. The phrase, "It's So Peaceful in the Country" is no longer the watchword. A reversal of this trend is necessary if our recreational areas are to serve the population as intended and we are to have truly restful environments.

The most desirable way to control noise is to decrease its intensity at the source. Often this is impractical and other means must be sought. Mechanical devices which screen off, diffuse or absorb sound have been employed indoors with considerable success, but outdoor sound control is an entirely different matter. Varying atmospheric conditions, many types of terrain and ground cover and other transient effects introduce variable which are impossible to control and extremely difficult to account for.

Plantings of trees and shrubs have been proposed to reduce noise and the recently completed study, "Trees and Shrubs for Noise Abatement, sponsored by the United States Forest Service, demonstrates that properly placed belts of trees and shrubs can reduce traffic noise appreciably. In this study the experimenters attempted to derive accurate useful information for the above purpose. Actual plantings of trees and shrubs in the form of shelterbelts and windbreaks on the Nebraska plains and screen plantings of shrub-tree combinations within the city were studied.

Traffic noises produced by trucks, cars, and city busses were recorded on magnetic tape to provide the sound source. These prerecorded sounds were played back through tree and shrub barriers and the sound level was measured behind the barriers at varying distances. This procedure was repeated at nearby locations under similar conditions of atmosphere, surface and terrain, but without trees, to evaluate the effectiveness of trees alone in reducing the noise level. A typical belt of trees used in the study is illustrated in Figure 1.

Seven tree belts were selected for final study and a graph of the noise reduction characteristics of one of the belts (Figure 2) shows the sound level, measured behind the trees at various distances from the noise source.

The supper group of curves comprises a theoretical point source sound projection curve, a truck noise control test curve (no trees) and 3 "tree" curves (for the 3 noise types studied). The lower group of 3 "excess attenuation" (noise reduction) curves show the reduction in sound level due to the presence of trees in excess of the natural attenuation due to distance absorption and other effects. Excess attenuations in the 5 to 8 decibel range are observed. This range was found to be typical for many of the belts studied. It may be noted here that the decibel "A" weighted dBA scale was used in reporting results. This is an internationally standardized scale found on precision sound level meters, which gives relatively high correlation with subjective estimates of the loudness of many common sounds.

Later experiments were designed to study the reduction of noise by tree belts as compared to other surfaces, over which the sound might pass. We projected sound over surfaces with varying degrees of hardness, such as a paved roadway, a hard surface, short grass, a medium surface, and tall grass or plowed ground, a soft surface. Figure 3 compares the sound-reducing properties of the various surfaces. The lower group of 3 "relative attenuation" curves shows the reduction which may be expected, when trees are compared to harder surfaces. Relative attentuation from 5 to 10 decibels (dBA) are typical. Here we may note that a 10 decibel reduction in sound level corresponds to about half as loud for most of the audible range.

A limited in-town study of the ability of shrubs backed up by taller trees to reduce urban traffic noises produced favorable results. Figure 4 shows the relative positions of sound source and belt and Figure 5 shows the noise reduction due to the trees. Projections through trees were compared with projections along a tree-lined street in this case, and some amplification above the theoretical point source projection was noticed.

The value of trees as noise screens is affected by proper placement, sufficient density and adequate tree height and belt width for each particular application. A relatively narrow belt of moderately tall trees, which would be adequate for noise screening in urban residential areas, might be ineffective in rural areas where large trucks and buses were the principle noise source. Sound level reductions of 5 to 8 decibels (dBA) as found in the experiments would, in many instances, reduce the noise level from "disturbing" to "not disturbing", particularly in the critical range of 65 to 70 dBA, where speech interference begins.

Special surface conditions, previously described, are an integral part of the evaluation of trees and shrubs as noise screens. When "soft" tree-shrub-grass combinations are compared to "hard" pavement surfaces, the reduction is considerably greater, often in the 8 to 12 dBA range, indicating a possible loudness reduction of more than one half.

A new study entitled "Short Term Programs" for Noise Abatement Using Forested Land Forms" is now underway. It is scheduled for completion in June 1973, but preliminary results indicate that combinations of trees, shrubs and land forms can provide almost immediate relief from intrusive noise, with a promise of continued improvement as the trees mature.

Recommendations for using trees and shrubs to control noise in recreational areas are based on findings detailed in the previously mentioned research bulletin RB-246. The following are offered:

1. To reduce noise from high-speed car and truck traffic in rural areas, such as rest areas and parks along Interstate highways, plant 65 to 100-foot-wide belts of trees and shrubs, with the near edge of the belt within 50 to 80 feet from the center of the nearest traffic lane.

2. To reduce noise from moderate speed traffic in urban areas, such as residential property adjacent to arterial streets, plant 20 to 50 foot wide belts of trees and shrubs with the nearest edge of the belt within 20 to 50 feet from the center of the nearest traffic lane. Shrubs should be placed close to the street with backup rows of taller trees.

3. Where the use of tall trees is restricted, use combinations of shorter shrubs and tall grass or similar soft ground cover, as opposed to harder paved surfaces.

4. Where year-round noise screening is desired, evergreens or deciduous varieties which retain their leaves throughout most of the year are recommended. Local nurserymen, extension horticulturists and landscape architects should be consulted for plant materials to be used in a given locality.

An additional broad recommendation, based on preliminary results of the new "tree and land form" study, is to take advantage of natural vegetation and ground configurations when planning roadside developments along highways and locating parks and playgrounds adjacent to arterial streets in urban areas.

Mr. **STRUNK**: Professor Cook, I have several questions. One was, most of them pertain to your experimental techniques. In the slides, you showed, earlier in your talk, you showed slides which showed the difference in location of measurement. Were you first measuring sound going through trees and then sound grazing over soil? The curve of the slide indicated that your measurement of sound going through trees, also was grazing over ground, which had been heavily covered with grass, whereas the measurement of sound going over a hard packed soil, which may approach something like a pavement, and I wonder—

Mr. **COOK**: This slide is not actually typical of all the situations, but that where we had to go to take the photographs. Now, we in every case, duplicated the surface behind the trees with what we used in the sound for the control right or in cases where that couldn't be done, sometimes you simply can't find that surface. We made supplementary tests to compare the reduction of the surface we used with another surface, so we are well aware of that factor and we tried to take it into account. But, that is the point on the slide there.

Mr. **STRUNK**: My second point or question is, when you were using the recording to duplicate the sound for two different test conditions, how did you insure that the sound power from your machine was the same?

Mr. **COOK**: We used in, before each run, a test to set the level of the sound at 92 dBA at 50 feet and the same setting before the run over the control surface. Now we have a calibrator and we check the equipment, if you want to go back that far, so that we are quite certain that the levels in both cases were within the dB of each other, so that has not been a problem. Incidentally, I might remark since it has been brought up here that whether 25 or 50 feet is better to use as a standard measuring distance, I don't care to comment on which is better, but we had in our particular case of testing the equipment just a little more consistent result with a 25-foot measuring distance. We had to up it about 4, I think 4 dBA's to get the equivalent, but we did prefer the 25 feet and we are using that now.

Mr. **STRUNK**: One final question. Do you have any measurements of a particular test condition where you normally were measuring sound grazing through the trees, where you measured in front of the trees and then in back and then determined what this might vary from the protected attenuation?

Mr. **COOK**: That type of a measurement is a—practically impossible to do, to conduct with any results that are meaningful because of the wind conditions that change so much from the front to the back of the belt. The wind gradients are a major problem and just about impossible to make a measurement through the trees and then go behind and make it behind the trees and compare the results. For example, what happens on the south side of the belt, if you have a south wind it will carry the sound through. If you go on the north side of the belt, there isn't any wind, so you might get much better results than you think you ought to have there, or you might get much worse. It has no meaning. So, we eliminated that very early from our consideration. You understanding that we tried it.

Mr. **STRUNK**: Yes, I was just wondering if it might be a better correlation just because there has been quite a bit of discussion on this use of trees.

Mr. **COOK**: The wind problems are very large, I will say that. It is our biggest variable.

Mr. **STRUNK**: Did you insure they were the same conditions from one test to another?

Mr. **COOK**: Only one tree test to a control test from day to day. You couldn't compare the sound levels on one day with the sound levels on the next day and have it mean anything.

Dr. **BERRY**: If you used your tape, presumably you had a point source?

Mr. **COOK**: Yes.

Dr. **Berry**: I only heard one truck, which would be at a point source. What would happen in heavy traffic, if you had an area source?

Mr. **Cook**: We have run into questions on that, whether we have, say, a line source or whatever it is. The regulations of a highway, require the trucks to stay a certain distance apart. We feel that line source wouldn't be representative of truck traffic patterns or even car traffic patterns and as you hear them, they come through as one and then another and then another. You don't hear that source. I think it might be impractical to try to evaluate that sort of thing, but I am sure a line source comparison wouldn't be meaningful or as meaningful as a point source. At least that's what I think at this time.

Dr. **Meyer**: There is a lot of controversy in this area and it is helpful. At this point then, I would like to thank the panelists, all the witnesses and other participants in this very important hearing, which has produced extremely valuable information for the Environmental Protection Agency. I hereby declare this hearing adjourned.

(Whereupon, at 5:30 o'clock p.m., the hearing was adjourned.)

(ADDITIONAL STATEMENTS FOR THE RECORD FOLLOW)

Sir:

I request that my comments be made a part of the record of the noise hearing that was held in Denver on September 30, 1971.

My life today is filled with a constant din from one source or another. At work I am surrounded by machines that produce various levels of noise. I am surrounded by noisy vehicles on my daily trek to and from work. In my home I have some amount of control over the noise level except when my neighbors or passing vehicles are the source.

Much of my spare time is spent in the nearby hills and mountains where I should be able to escape the pollutions of the city. I go to the wilderness for peace and quiet and what do I find? I find trail bikes in the summer and snowmobiles in the winter. I believe the wilderness is a place for only things of nature. Man is a part of nature but mans machines have no place there.

I believe a man on foot can enjoy the wilderness with very little impact on the land and its inhabitants. But when man takes his noisy machines there the impact is multiplied by unknown factors. He accomplishes the crimes of frightening off the wildlife, sometimes intentionally by pursuit, and of leaving ugly scars to despoil the beauty of the terrain. He also completely destroys the serenity of nature by the intrusion of unnatural noise.

Man needs the wilderness, much more wilderness, as a place of peace and quiet and natural things. He needs a place to get away from the cities and become a part of nature for a time.

The noise of the city is very undesirable but when even a small part of that noise is forced into the forests, mountains and other wilderness it becomes completely intolerable.

Paul S. Norman
2840 Kenyon Circle
Boulder, Colorado 80303

Sir:

Thank you for inviting the National Audubon Society to testify at your recent hearings in Denver. Previous committments in Montana that week precluded my attendance, however our Society did have a representative in the audience and we are very interested in the ongoing efforts of your agency regarding this subject. Each of the many forms of environmental pollution present numerous economic, social, and ecological problems, and noise pollution will certainly challenge us with its own particular set of problems.

Quantitative data regarding the effect of noise on wildlife is unfortunately lacking, however it can be safely said that mechanized vehicles (snowmobiles, trail bikes, etc.) will cause varying degrees of stress upon wildlife which could be damaging, if not fatal, especially during months of the year when other stress factors are having their effects (i.e. cold weather, gestation period, food shortage, etc.) For this reason both muffling devices and carefully zoned vehicle use areas should be required. More biological research is desparately needed.

Technical advances, primarily from the aerospace industries, should be evaluated and considered which limit sound intensity levels and various disturbing frequency ranges caused by mobile and stationary mechanical sources. Often the life expectancy is significantly increased for mechanical equipment (e.g. geothermal steam devices) which more than compensates the cost of installing proper muffling devices or designing "quietness" into the mechanisms.

Physiologically the medical societies have provided a wealth of information regarding the effects of noise on human beings and I know you're well acquainted with their findings—we could add nothing new.

Commenting specifically on your "hearing objectives":

(1) Much research is needed, *but* much has been accomplished to date by industry and needs to be applied.

(2) Legislation is obviously needed to define noise standards. This legislation should also include data regarding areas where various noise producing mechanisms should be excluded or rigidly controlled (i.e. wilderness, residential areas, parks, etc.).

(3) Enforcement is the key.

This entire field of noise control is both complex and challenging. We encourage your efforts towards finding some of the solutions.

Robert K. Turner
Rocky Mountain Regional Representative
National Audubon Society
Box 3232
Boulder, Colorado

Sir:

We understand there is a bill before Congress (Senate bill 1018 and House bill HR 5388) which would legislate noise control standards which cannot be made more stringent by states, counties, or cities. Apparently, these standards are much more lax than those presently in effect in Boulder and would destroy the effectiveness of Boulder's noise control efforts.

Mr. Tom Martin, our noise control officer, has done an outstanding job in controlling noisy vehicles, especially motorcycles and small sports cars, and since we live on a very busy street and opposite a cycle repair shop, we are particularly interested in seeing that the local noise control situation isn't hampered by standard federal regulations which would take away our own city control.

We hope that the present bill can be modified as to the noise control since this is getting to be a major problem in our environment.

Mr. and Mrs. Charles P. White

Gentlemen:

I would like to give you an example of what problems uncontrolled noise can create for people in an area. There are a number of motorcycle sales and service establishments located right in the center of settled areas and adjacent to restricted commercial and residential areas.

In our particular experience, a motorcycle establishment set up shop eighteen months ago within 100 feet of our residence where we have lived for over 15 years. The motorcycle people have practically taken over the area. They service motorcycles, both racing and street variety, in the open and not properly mufflered at all hours. They roar and gun the motors and the noise can be heard for blocks. Then at times they test run them wide open up and down the street. In addition the motorcycle establishment attracts motorcyclists who gun the cycles coming and going. The noise is of such magnitude that you can't hear what another person is saying in the same room. After hours of that type of irritation, one's nervous system has taken a beating, not to mention the indignation of having one's rights violated and the enjoyment of your home ruined. This condition is repeated in a number of other areas and people have no recourse.

Frequent discussions with city officials are most discouraging due to the fact they have no ordinance to cover this type of thing and the state law enacted in 1971 does not provide for enforcement other than a civil suit.

Due to a certain class of citizens who are among the customers of a motorcycle shop, many people (including us) are reluctant to file a complaint or in any way make themselves known because of fear of retaliation.

I strongly feel that a serious matter of this nature should be called to your attention and should be considered in your deliberations. It's possible that you are not aware that this type of situation exists. The average citizen is in desperate need of a law setting reasonable noise levels and provision for enforcement.

A Concerned Citizen

Sir:

In reading an article in our local paper about the hearings to be conducted on Noise Abatement and control it was requested that any interested person should write to you at the above address. You may be able to draw this complaint to the proper authorities for investigation, and I'm sure you've heard it many times before, but not quite as loud as up here.

The town of Polson is located up here in the mountains on the south shore of Flathead lake. It is almost strictly a summer resort area and known as the Gatewaye to Glacier National Park. It is also on the earthquake fault so we are becoming used to tremors that shake us up in the middle of the night, rattle the windows and dishes, and when they pass through above the Richter Scale rating of 4 its something to talk about. We also tolerate the recreational vehicles, tractors, bikes etc., your committee is investigating BUT we are getting mighty tired of those military (?) aircraft that is breaking the sound barrier over our heads!

Have you ever been on top of a mountain when the sound barrier is broken? I've been hunting, hiking, fishing etc., where the birds, squirrels and woods noises are in full sway until one of these planes goes over with their blast. It really rattles the timber! For at least a half hour afterwards not a sound is made, and I rather imagine I've jumped a few feet each time it occurs.

Its bad enough in the woods but here in town its worse. I've traveled around the world and heard blasts in many sections but its worse up in this area. This happens once or twice a day and really vibrates along with the blast. Until you hear the plane motors you can't be sure if it was an earthquake or not! With the loud evplosion of present day planes I for one am sure thankful the SST was phased out before it became one of our problems too. When the sound barrier is broken this house shakes, the windows are so close to breaking with the concussion and my nerves are getting a little frayed. So far we have not complained hoping it was only a temporary situation that would go away but now its becoming just a little intolerable. Earthquakes we can't do anything about but man-made noises can be stopped one way or the other.

I notice your committee doesn't mention this loudest and most offensive of all noises, hence this complaint to draw it to your attention. Prior your hearing if someone would take the time to spend a few days up here and record a few of these blasts and meter their strength I'm sure you will have reason to take it up with the proper authorities and require aircraft to fly at a reasonable speed and cease breaking the barrier. Wishing you and your committee good luck in the endeavor,

A. L. McAtee
Box 889
Polson, Mont.

Sir:

Kindly enter this letter as part of the hearing record concerning noise pollution.

My thanks for the EPA booklet, "Noise Abatement Program" and "Plan for National Hearings On Noise Abatement Control". I agree with most of the points in them and wish to encourage EPA in its attempts to alleviate a very complex and insidious situation.

As the EPA booklet points out, noise is often a spinoff, resulting from useful work, and hence it is often at least consciously ignored or accepted as necessary. Thus, it seems to me that the danger is that we do not realize its effects and have learned to accept something harmful.

On the other hand, silence should be a right available for each of us to enjoy as he pleases. The animals need silence; so do men. Yet the long drone of motorcycles in suburbs disturbs our quiet nights and whether we know it or not chafes the nerves, can increase blood pressure.

Yet even outside cities often one can not escape noise. For example, once attempting to escape Los Angeles for a weekend, my wife and I spent hours driving to San Gorgonio Peak only to find the loudspeaker of a concession that could be heard for miles blaring. I presume this was on government land and hence was done with at least tacit government approval. No doubt, snowmobiles, that frighten game and disturb hikers, are quite popular there in the winter.

It is my hope that EPA can take effective and enforceable measures to correct such situations and thus help restore the quality of life for us all.

Peter Wild
1527 East Lester
Tucson, Arizona

Sir:

We wrote you some weeks ago in support of stringent noise controls and in favor of a federal noise control bill. Since then, to our horror, we have discovered that the federal bill, as now outlined, would not allow state and local governments to create and enforce tougher noise control standards than those in the federal bill.

We urge you to work for changes in the bill allowing stronger local standards than those outlined as federal levels. In Boulder there is an 80 decibel limits, although vehicles of 10,000 pounds or more may create up to 88 decibels in the daytime plus the same variance along certain major thoroughfares at night. If the federal proposal, allowing 92 decibels, is passed, it will be a regressive step for the city of Boulder and for other localities which have already acted on the noise problem. Please do not allow this to happen.

Please include this letter as part of the Noise Hearings Record.

Mr. and Mrs. Glenn W. Cushman
2131 Bluebell
Boulder, Colorado

Sir:

We are writing to urge that you and your committee establish strict noise controls as we believe that the excessive amount of noise in today's world is having an adverse affect on both the mental and physical health of our population. Numerous studies which you have probably read indicate that hearing loss, various nervous disorders, and even an occasional heart attack can result from loud and continuous noise.

We especially urge you to set levels below 88 decibles for motorized vehicles such as sports cars, motorcycles, and snowmobiles as these seem to be the worst offenders in both city and countryside. A few years ago it was possible to hike or snow-shoe into remote areas and escape temporarily from the sound of motors, but now vehicles have invaded all but the most rigidly protected wilderness areas and there is no longer any escape from their noise. It is difficult now to hear the sounds and silences of nature.

In the city the crescendo of noise is even worse. Here in Boulder we have a city noise ordinance, but it is almost impossible to enforce because there are no federal controls so the manufacturers continue to make cars and motorcycles as noisy as possible. In the summer the traffic din is so bad that we have to leave the electric fan on all night in order to try to "mask" the more erratic noise of the traffic. This is certainly a bad solution since the sound of the fan is irritating (but not so irritating as the traffic) and we are wasting electricity thus placing a heavier burden on our natural resources.

The Office of Noise Abatement and Control now has a chance to take a small step to lessen noise pollution. We hope you will take that step. Please include this letter in your Hearing Record on Noise as we were unable to attend the hearings in Denver on September 30.

Carol and Glenn Cushman
2131 Bluebell
Boulder, Colorado

Sir:

I have become more and more concerned over the increasing level of noise in the city of Boulder. Traffic noise and construction noise are particularly bad, and yet Boulder probably has a lower noise level than most cities since we have a city noise ordinance. However, I feel very strongly that what is needed is federal regulations of allowable noise levels rather than local regulation, although local ordinances should still be maintained if they are stricter than the federal limit. If there were federal restrictions on motor vehicle noise, for instance, perhaps the manufacturers would design quieter motors and more effective mufflers and thus make enforcement of local ordinances more feasible.

I urge you and your office to propose strong noise controls as the result of your recent Noise Hearings. Please include this letter as part of the Hearings Record held in Denver on September 30.

(Mrs.) Florence T. Scheerer
2131 Bluebell
Boulder, Colorado

Sir:

Snowmobiles and trail bikes should be totally prohibited in all places where people go—off roads—on foot, or on snowmobiles, or on horseback, to enjoy the beauty and the *silent peace* of nature. Please add this to the record of the recent hearing in Denver.

Yours Truly,
Franklin S. Pollak
1333 Bluebell
Boulder, Colorado

MEMORANDUM

Sir:

In view of the extensive criticism the Armed Services are receiving nationwide, it is hoped that this Administration, at the Department of Defense level and military installations such as the U. S. Air Force Academy, would make a better and major effort in their community relations program.

The attached Resolution is submitted as a complaint against the U. S. Air Force Academy's community relations in conjunction with their air operations, especially their sail plane Soaring Project. This is the third summer of extensive operations of the glider program. Upon the initiation of the program there was no contact made with the community south of the Air Force Academy, with the possible exception of a press release.

The Soaring Project was simply imposed upon the community. The basic complaint of the citizens living south of the U. S. Air Force Academy is that the tow planes are operating at very low altitudes under full power pulling a glider and releasing the glider over a populated area. The operations begin at 6 a.m. and terminate at 6 p.m., with accompanying noise pollution in the residential homes which is deafening. It is suggested that the U. S. Air Force Academy should cancel a program such as the Soaring Project at this location. The project is more recreational than necessary to the orientation of cadets to flying and to the development of a potential career of a young officer in the U. S. Air Force.

With emphasis on "bottom dollar" in Armed Services expenditure, it is suggested that the Department of Defense and the U. S. Air Force reconsider the operation of two major air facilities in the Colorado Springs area. It is hoped that the initiative would come from the Armed Services to make the cost saving and cancel the Soaring Project in order to make a major savings.

When many residents of the community adjoining the Air Force Academy considered purchase of their land, direct contact was made with the Air Force Academy officials, who advised these residents that there would be no air operations south of the Air Force Academy and west of Highway 25 but rather the landings and takeoffs would be from the northeast and southeast. In this respect, the U. S. Air Force has broken faith with many members of the community and at the same time imposed a very undesirable high-level noise pollutant in exchange for a quasi-recreational program which would well be transferred to one of the Air Training Command bases where the population is not as dense or projected to surround the air facility.

RESOLUTION

To develop good immediate and long-range community relations for the U. S. Air Force Academy, to prevent environmental damage by the U. S. Air Force Academy's Soaring Program, and to maximize cost effectiveness of the Department of Defense Expenditures.

WHEREAS, the National Environmental Policy Act of 1969 requires all federal agencies to file a statement on the impact of projects on the environment; and

WHEREAS, the reciprocating engine tow planes operating in conjunction with the U. S. Air Force Academy's sail plane Soaring Project at low altitudes over residential areas have caused problems of deafening noise pollution; and

WHEREAS, the existing and projected cadet flight operations at the U. S. Air Force Academy will increase both noise and air pollution; and

WHEREAS: the costs of the sail plane Soaring Project, including tow plane and personnel, are excessive for a quasi-recreational cadet program; and

WHEREAS, the U. S. Air Force Academy has numerous means of indoctrinating cadets in flying experiences; and

WHEREAS, the existing and projected increase in population of the residential community surrounding the U. S. Air Force Academy demand reexamination of flight operation and new facilities, when the U. S. Air Force has several flight training bases in existence and are closing bases; and

WHEREAS, the Armed Services of the United States are under extensive criticism and need good community relations; and

WHEREAS, it is important for the U. S. Air Force to take the initiative in community relations,

THEREFORE, BE IT RESOLVED that the U. S. Air Force Academy discontinue the sail plane Soaring Project at the U. S. Air Force Academy location; reexamine the necessity of the cadet flight training program at the U. S. Air Force Academy location; the U. S. Air Force Academy conduct an environmental impact study relative to the existing residential and projected residential population surrounding the Academy, as well as the noise and air pollution; the Department of Defense and the U. S. Air Force Academy take the initiative in establishing effective community relations in lieu of imposing unnecessary noise pollution on its Good Neighbors.

Signed By
125 People
—CEW

Sir:

As was correctly pointed out at the conclusion of my testimony at the Denver hearings on my report on Sound Level Tests of Tractors at the Nebraska Tractor Test Laboratory, I specifically pointed out that dBC ratings and dBA ratings are not comparable —and then proceeded to do so. As I also pointed out we maintain a permanent recording of the frequency spectrum for each test. Therefore upon my return I have obtained the dBC ratings for all tractors tested in the 1970-71 season and I include these readings in this letter. We also have available for anyone interested the dB linear readings for all tractors tested.

To get a direct comparison with the survey made by Simpson and Deshayes, the average noise level for tractors tested in their report was 104.8 dBC for tractors having an average of 48.85 drawbar horsepower. The average noise level for tractors tested at the Nebraska Tractor Test Laboratory (1970-71) was 102.3 dBC. More significant, I feel, are the noise levels for tractors tested during the 1971 season. The average noise level for 12 American made tractors tested so far this year was 101.2 dBC for tractors averaging 98.02 drawbar horsepower. Therefore three has been a 3dBC decrease in noise level (not 10 as I indicated) for tractors averaging over twice the horsepower.

I trust that this information can be entered in the record at the appropriate place to clarify the matter.

W. E. Splinter,
Chairman,
Department of Agricultural Engineering,
University of Nebraska

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